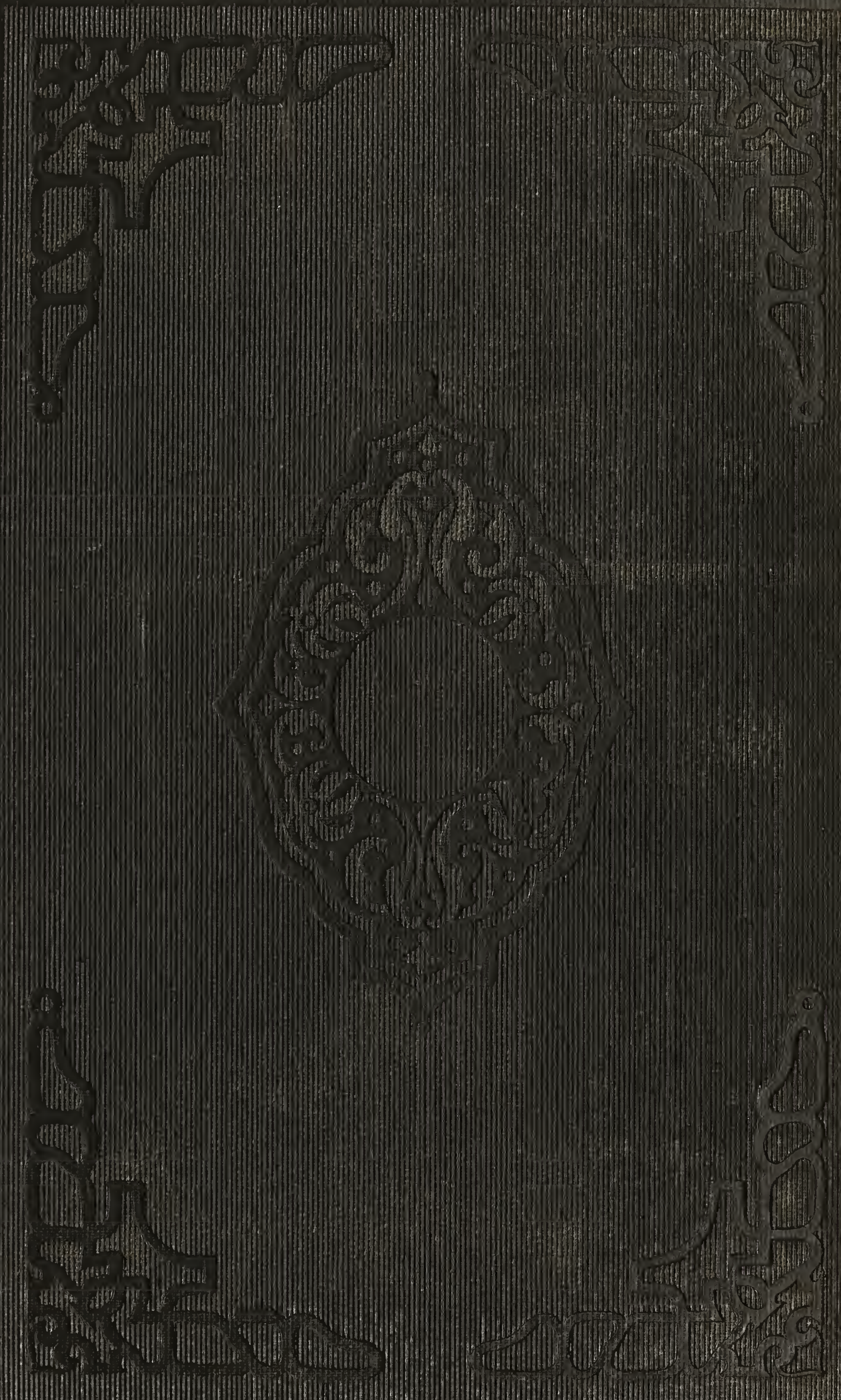

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EVERY LADY

Her Own Flower Gardener.

ADDRESSED TO THE

INDUSTRIOUS AND ECONOMICAL.

CONTAINING

SIMPLE AND PRACTICAL DIRECTIONS

FOR

CULTIVATING PLANTS AND FLOWERS

IN THE GARDEN AND IN ROOMS.

BY LOUISA JOHNSON.

Revised from the Fourteenth London Edition, and Adapted to the

USE OF AMERICAN LADIES.

NEW YORK:
A. O. MOORE, AGRICULTURAL BOOK PUBLISHER,
(LATE C. M. SAXTON & CO.,)
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PUBLISHER'S ADVERTISEMENT

THE Publisher, having found the want of small, cheap Books, of acknowledged merit, on the great topics of farming economy, and meeting for those of such a class a constant demand, offers, in his Rural Handbooks, of which this is one, works calculated to fill the void.

He trusts that a discerning Public will both buy and read these little Treatises, so admirably adapted to all classes, and fitted by their size for the pocket, and thus readable at the fireside, on the road, and in short everywhere.

C. M. SAXTON,

Agricultural Book Publisher.

I HAVE been induced to compile this little work from hearing many of my companions regret that no single book contained a sufficiently condensed and general account of the business of a Flower Garden. "We require," they said, "a work in a small compass, which will enable us to become our own gardener; we wish to know how to set about everything *ourselves*, without expense, without being deluged with Latin words and technical terms, and without being obliged to pick our way through multiplied publications, redolent of descriptions, and not always particularly lucid. We require a practical work, telling us of useful flowers, simple modes of rearing them, simply expressed, and free from lists of plants and roots which require expensive methods of preservation. Some of us have gardens, but we cannot afford a gardener; we like flowers, but we cannot attempt to take more than common pains to raise them. We require to know the hardiest flowers, and to comprehend the general business of the garden, undisturbed by fear of failure, and at the most economical scale of expense. Who will write us such a book?"

I have endeavored to meet their views; and my plan of Floriculture may be carried into effect by any lady who can command the services of an old man, a woman, or a stout boy. In the present Edition, the publishers have added a paper on Window Gardening, written by Mr. M'Intosh—and another on Domestic Greenhouses, an apparatus by which a small collection of exotics may be given in great perfection, and by a process which any lady may superintend with much gratification. In every other respect the work is the result of my own experience, and I dedicate it to all of my own sex who delight in flowers, and yet cannot allow themselves to enter into great expense in their cultivation.

LOUISA JOHNSON.

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LADIES FLOWER GARDENER.

CHAPTER I.

INTRODUCTION.

IT has been well remarked that a garden affords the purest of human pleasures. The study of Nature is interesting in all her manifold combinations: in her wildest attitudes, and in her artful graces. The mind is amused, charmed, and astonished in turn, with contemplating her inexhaustible display; and we worship the God who created such pure and simple blessings for his creatures. These blessings are open to all degrees and conditions of men. Nature is not a boon bestowed upon the high-born, or purchased by the wealthy at a kingly price. The poor, the blind, the halt, and the diseased, enjoy her beauty, and derive benefit from her study. Every cottager enjoys the little garden which furnishes his table with comforts, and his mind with grateful feelings, if that mind is susceptible of religious impressions. He contemplates the gracious Providence which has bestowed such means of enjoyment upon him, as the Father whose all-seeing eye provides for the lowliest of his children; and who has placed the "purest of human pleasures" within the reach of all who are not too blind to behold his mercy. With this blessed view before his mental sight, the cottager cultivates his little homestead. The flowers and fruits of the earth bud, bloom, and decay in their season; but Nature again performs her deputed mission, and spring succeeds the dreary winter with renewed beauty and twofold increase. Health accompanies simple and natural pleasures. The culture of the ground affords a vast and interminable field of observation, in which the mind ranges with singular pleasure, though the body travels not. It surrounds home with an unceasing interest; domestic scenes become endeared to the eye and mind; worldly cares recede; and we may truly say—

> "For us kind Nature wakes her genial power,
> Suckles each herb, and spreads out every flower!
> Annual for us, the grape, the rose, renew
> The juice nectarious, and the balmy dew:
> For us, the mine a thousand treasures brings;
> For us, health gushes from a thousand springs."
> *Eth.* ep. i. ver. 129.

The taste for gardening in England began to display itself in the reign of Edward III., in whose time the first work on the subject was composed by Walter de Henly. Flower-gardening followed slowly in its train. The learned Linacre, who died in 1524, introduced the damask rose from Italy into England. King James I. of Scotland, when a prisoner in Windsor Castle, thus describes its "most faire" garden:—

> "Now was there maide fast by the towris wall,
> A garden faire, and in the corneris set
> An herbere green, with wandis long and small
> Railit about, and so with treeis set
> Was all the place, and hawthorn hedges knet,
> That lyfe was now, walking, there forbye,
> That might within scarce any wight espie,
> So thick the bowis and the leves grene
> Bercandit all, the alleyes all that there were;
> And myddis every herbere might be sene
> The scharpe grene swete junipere
> Growing so fair, with branches here and there,
> That, as it seymt to a lyfe without,
> The bowis spred the herbere all about."
> *The Quair.*

Henry VIII. ordered the formation of his garden at Nonsuch about the year 1509, and Leland says it was a "Nonpareil."

Hentyner assures us of its perfect beauty, describing one of its marble basins as being set round with "lilac trees, which trees bear no fruit, but only a pleasant smell."

The pleasure-gardens at Theobalds, the seat of Lord Burleigh, were unique, according to the report of Lyson. In it were nine knots exquisitely made, one of which was set forth in likeness of the king's arms. "One might walk two myle in the walks before he came to an end."

Queen Elizabeth was extremely fond of flowers, and her taste ever influenced that of her court. Gilliflowers, carnations, tulips, Provence and musk roses, were brought to England in her reign.

William III. loved a pleasaunce or pleasure-garden; but he introduced the Dutch fashion of laying them out, which is still horrible in our eyes. His Queen superintended in person all her arrangements in the flower-garden,—an amusement particularly delightful to her. In those days, "knottes and mazes" were no longer the pride of a parterre, with a due allowance of "pleasant and fair fishponds."

Queen Anne remodeled the gardens at Kensington, and did away with the Dutch inventions. Hampton Court was also laid out in a more perfect state in her reign, under the direction of Wise.

Since that period, flower-gardening has progressed rapidly; and the amusement of floriculture has become the dominant passion of the ladies of Great Britain. It is a passion most blessed in its effects, considered as an amusement or a benefit. Nothing humanizes and adorns the female mind more surely than a taste for ornamental gardening. It compels the reason to act, and the judgment to observe; it is favorable to meditation of the most serious kind; it exercises the fancy in harmless and elegant occupation, and braces the system by its healthful tendency. A flower-garden, to the young and single of my sex, acts upon the heart and affections as a nursery acts upon the matronly feelings. It attaches them to their home; it throws a powerful charm over the spot dedicated to such deeply-interesting employment; and it lures them from dwelling too deeply upon the unavoidable disappointments and trials of life, which sooner or later disturb and disquiet the heart.

An amusement which kings and princes have stamped with dignity, and which has afforded them recreation under the toils of government, must become for ever venerated, and will be sought for by every elegant as well as by every scientific mind. Floriculture ranges itself under the head of female accomplishments in these our days; and we turn with pity from the spirit which will not find in her "garden of roses" the simplest and purest of pleasures.

CHAPTER II.

GENERAL REMARKS.

IN the laying out of a garden, the soil and situation must be considered as much as the nature of the ground will admit. Let no lady, however, despair of being able to raise fine flowers upon any soil, providing the sun is not too much excluded, for the rays of the sun are the vital principle of existence to all vegetation. The too powerful rays can be warded off by the arts of invention, but we have yet no substitute for that glorious orb. Unless its warm and forcing influence is allowed to extend over the surface of the garden, all flowers wither, languish, and die. Sun and air are the lungs and heart of flowers. A lady will be rewarded for her trouble in making her parterre in the country; but in large towns, under the influence of coal smoke, shade, and gloom, her lot will be constant disappointment. She can only hope to keep a few consumptive geraniums languishing through the summer months, to die in October, and show the desolating view of rows of pots containing blackened and dusty stems.

Many soils which are harsh or arid, are susceptible of improvement by a little pains. Thus, a stiff clay, by digging well and leaving it to become pulverized by the action of the frost, and then mixing plenty of ashes with it, becomes a fine mould, which I have ever found most excellent for all flowers of the hardier kind. The black soil is the richest in itself, and requires no assistance beyond changing it about a foot in depth every three years, as a flower garden requires renewing, if a lady expects a succession of handsome flowers. The ground should be well dug the latter end of September or October, or even in November, and if the soil is not sufficiently fine, let it be dug over a second or third time, and neatly raked with a very fine-toothed rake.

Stony ground requires riddling well, and great care must be taken to keep it neat by picking up the little stones which constantly force themselves to the surface after rains. Nothing is so unbecoming as weeds and stones in parterres, where the eye seeks flowers and neatness.

Almost every plant loves sand; and if that can be procured, it enriches and nourishes the soil, especially for bulbs, pinks, carnations, auriculas, hyacinths, &c. Let it be mixed in the proportion of a third part to the whole.

If the dead leaves are swept into a mound every autumn, and the soap suds, brine, &c., of the house be thrown upon it, the mass will quickly decompose, and become available the following year. It makes an admirable compost for auriculas, &c., mixed with garden or other mould.

If the ground be a gravelly soil, the flower-garden should not slope, for stony ground requires all the moisture you can give it, while the sloping situation would increase the heat and dryness. A moist earth, on the contrary, would be improved by being sloped towards the east or west.

The south is not so proper for flowers, as a glaring sun withers the tender flowers; but the north must be carefully avoided, and shut out by a laurel hedge, a wall, or any rural fence garnished with hardy creepers, or monthly roses, which make a gay and agreeable defense. Monthly roses are invaluable as auxiliaries of all kinds. They will grow in any soil, and bloom through the winter months, always giving a delicate fragrance, and smiling even in the snow. Monthly roses will ever be the florist's delight: they are the hardiest, most delicate-looking, and greenestleaved of garden productions; they give no trouble, and speedily form a beautiful screen against any offensive object. No flower garden should exist without abundance of monthly roses.

It has often been a disputed point whether flower gardens should be intersected with gravel walks or with grass plots. This must be left entirely to the taste and means of the party forming a garden. Lawn is as wet and melancholy in the winter months, as it is beautiful and desirable in summer; and it requires great care and attention in mowing and rolling, and trimming round the border. Gravel walks have this advantage: the first trouble is the last. They will only require an old woman's or a child's assistance in keeping them free from weeds; and a lady has not the same fears of taking cold, or getting wet in her feet, during the rains of autumn and spring.

Many females are unequal to the fatigue of bending down to flowers, and particularly object to the stooping posture. In this case, ingenuity alone is required to raise the flowers to a convenient height; and, by so doing, to increase the beauty and picturesque appearance of the garden. Old barrels cut in half, tubs, pails, &c., neatly painted outside, or adorned with rural ornaments, and raised upon feet neatly carved, or mounds of earth, stand in lieu of richer materials, such as vases, parapet walls, and other expensive devices, which ornament the gardens of the wealthy. I have seen these humble materials shaped into forms as pleasing to the eye, and even more consonant to our damp climate, than marble vases. They never look green from time, and are renewed at a very trifling expense. A few pounds of nails, and the unbarked thinnings from fir plantations, are the sole requisites towards forming any device which a tasteful fancy can dictate; and a little green paint adds beauty and durability when the bark falls from the wood it protects. I have seen fir balls nailed on to these forms in tasteful patterns; and creepers being allowed to fall gracefully over the brims, give a remarkably pleasing and varied appearance to the parterre.

Where mould is not easily to be procured—as, for instance, in towns—the tubs or receptacles may be half filled with any kind of rubble, only space must be left to allow of two feet of fine mould at the top, which is quite sufficient for bulbous roots, creepers, &c. These receptacles have one powerful advantage over ground plots; they can be moved under sheds, or into outhouses, during the heavy rains or frosts of winter; and thereby enable a lady to preserve the more delicate flowers, which would deteriorate by constant exposure to inclement weather.

A lady requires peculiar tools for her light work. She should possess a light spade; two rakes, one with very fine teeth, and the other a size larger, for cleaning the walks when they are raked, and for raking the larger stones from the garden borders. A light garden fork is very necessary to take up bulbous or other roots with, as the spade would wound and injure them, whereas they pass safely through the interstices of the fork or prong. A watering-pot is indispensable, and a hoe. Two trowels are likewise necessary; one should be a tolerable size, to transplant perennial and biennial flower roots; the other should be pointed and small, to transplant the more delicate roots of anemones, bulbs, &c.

The pruning-knife must be always sharp, and, in shape, it should bend a little inwards, to facilitate cutting away straggling or dead shoots, branches, &c. The "avroncator," lately so much in request, is an admirable instrument; but it is expensive, and of most importance in shrubberies, where heavy branches are to be cut away. The Sieur Louis d'Auxerre, who wrote a work upon gardening in 1706, has a sketch of the avroncator of the present day, which he designates as caterpillar shears.

A light pair of shears, kept always in good order, is necessary to keep privet or laurel hedges properly clipped; and a stout deep basket must be deposited in the tool-shed, to contain the weeds and clippings. These are the only tools absolutely *essential* to a lady's garden. I have seen a great variety decorating the wall of an amateur tool-house, but they must have been intended for show, not for use. A real artiste, in whatever profession she may engage, will only encumber herself with essentials. All else is superfluous.

I have reserved two especially necessary recommendations to the last, being comforts independent of the tool-house. Every lady should be furnished with a gardening apron, composed of stout Holland, with ample pockets to contain her pruning-knife, a small stout hammer, a ball of string, and a few nails and snippings of cloth. Have nothing to do with scissors; they are excellent in the work-room, but dangerous in a flower garden, as they wrench and wound the stems of flowers. The knife cuts slanting, which is the proper way of taking off slips; and the knife is sufficient for all the purposes of a flower garden, even for cutting string.

The second article which I pronounce to be indispensable is a pair of India rubber shoes, or the wooden high-heeled shoes called "sabots" by the French. In these protections, a lady may indulge her passion for flowers at all seasons, without risk of rheumatism or chills, providing it does not actually rain or snow: and the cheering influence of the fresh air, combined with a favorite amusement, must ever operate beneficially on the mind and body in every season of the year.

CHAPTER III.

ON LAYING OUT.

THERE are many modes of adorning a small piece of ground, so as to contain gay flowers and plants, and appear double its real size. By covering every wall or palisade with monthly roses and creepers of every kind, no space is lost, and unsightly objects even contribute to the general effect of a "Plaisaunce." The larger flowers, such as hollyhocks, sunflowers, &c., look to the best advantage as a back ground, either planted in clumps, or arranged singly. Scarlet lychnis, campanula, or any second-sized flowers, may range themselves below, and so in graduated order, till the eye reposes upon a foreground of pansies, auriculas, polyanthuses, and innumerable humbler beauties. Thus all are seen in their order, and present a mass of superb coloring to the observer, none interfering with the other. The hollyhock does not shroud the lowly pansy from displaying its bright tints of yellow and purple; neither can the sturdy and gaudy sunflower hide the modest double violet or smartly clad anemone from observation. Each flower is by this mode of planting distinctly seen, and each contributes its beauty and its scent, by receiving the beams of the sun in equal proportions.

If the trunk of a tree stands tolerably free from deep overshadowing branches, twine the creeping rose, the late honeysuckle, or the everlasting pea round its stem, that every inch of ground may become available. The tall naked stem of the young ash looks well festooned with roses and honeysuckles.

Wherever creeping flowering plants can live, let them adorn every nook and corner, stem, wall, and post; they are elegant in appearance, and many of them, particularly clematis, are delicious in fragrant scent.

If flowers are planted in round or square plots, the same rule applies in arranging them. The tallest must be placed in the center, but I recommend a lady to banish sunflowers and hollyhocks from her plots, and consign them to broad borders against a wall, or in clumps of three and three, as a screen against the north, or against any unsightly object. Their large roots draw so much nourishment from the ground, that the lesser plants suffer, and the soil becomes quickly exhausted. Like gluttons, they should feed alone, or their companions will languish in starvation, and become impoverished. The wren cannot feed with the vulture.

The south end or corner of a moderate flower garden should be fixed upon for the erection of a root house, which is not an expensive undertaking, and which forms a picturesque as well as a most useful appendage to a lady's parterre. Thinnings of plantations, which are everywhere procured at a very moderate charge, rudely shaped and nailed into any fancied form, may supply all that is needful to the little inclosure; and a thatch of straw, rushes, or heather, will prove a sure defense to the roof and back. There, a lady may display her taste by the beauty of the flowers which she may train through the rural frame-work. There, the moss-rose, the jessamine, the honeysuckle, the convolvulus, and many other bright and beautiful flowers, may escape and cluster around her, as she receives rest and shelter within their graceful lattice-work. There, also, may be deposited the implements of her vocation; and during the severe weather, its warm precincts will protect the finer kinds of carnations, pinks, auriculas, &c., which do not bear the heavy rains, or frosts of lengthened duration, without injuring the plant.

Flowers are divided into three classes:—annuals, biennials, and perennials.

Annuals are those flowers which are raised from seeds alone, in the spring, and which die in the autumn. They are again divided into three classes:—the tender and more curious kinds; the less tender or hardier kinds; and the hardiest and common kinds.

Biennials are those flowers which are produced by seed, bloom the second year, and remain two years in perfection, after which they gradually dwindle and die away.

Some sorts, however, of the biennials, afford a continuation of plants by offsets, slips, and cuttings of the tops, and by layers and pipings, so that, though the parent flower dies, the species are perpetuated, particularly to continue curious double-flowered kinds, as for instance, double rockets, by root offsets, and cuttings of the young flower-stalks; double wallflowers by slips of the small top shoots; double sweet-williams by layers and pipings; and carnations by layers.

Perennials are those flowers which continue many years, and are propagated by root offsets, suckers, parting roots, &c., as will be more fully particularised under the head of *Perennials.*

It has been a debated point among florists whether plots or baskets should be devoted each to a particular variety of flower, or receive flowers of different kinds, flowering at separate seasons. Thus, many ladies set apart one plot of ground for anemones only—another plot receives only pansies, and so on. There is much to be said on both sides the question.

If a plot of ground is devoted to one variety of flower only, you can give it the appropriate mould, and amuse your eye with its expanse of bright coloring. Nothing is more beautiful than a bed of pansies, or a bed of the bright and glowing scarlet verbina; nothing can exceed the gay and flaunty tints of a bed of tulips, or the rich hues of the lilac and the white petunia. A large space of garden allows its possessor to revel in separate beds of flowers, whose beauty is increased twofold by masses; and from that very space, the eye does not so easily discover the melancholy appearance of one or more plots exhibiting nothing but dark mould, and withered stems, arising from the earlier sorts being out of bloom.

But in less spacious gardens, this gloomy and mournful vacuum must be avoided. Every border and plot of ground should exhibit a gay succession of flowers in bloom; and that object can only be effected by a pretty equal distribution of flowers of early and late growth. As the May flowers droop, the June productions supply their place; and these, again, are followed in succession, till the Golden rod and Michaelmas day daisy announce the decadence of the parterre for the year.

Yet every flower may be supplied with its favorite soil with a little patience and observation. A light soil suits all descriptions very well; and I never yet found disappointment in any description of earth which was thoroughly well dug, and dressed yearly from the mound of accumulated leaves and soap-suds, alluded to in the first chapter. I particularly recommend a portion of sand mixed with the heap. All bulbs, carnations, pinks, auriculas, ranunculuses, &c., love a mixture of sand. I know no flowers of the hardy class which reject it. Mix sand well into your borders and plots, and you will not fail to have handsome flowers.

I subjoin a list of common flowers appertaining to each month, in order to fill the borders with one or more roots of each variety. I do not include the annuals.

JANUARY.

In this month the following flowers are in blow:—

Single Anemones
Winter Cyclamens
Michaelmas Daisy
Hepaticas

Primroses
Winter Hyacinth
Narcissus of the East
Christmas Rose

FEBRUARY.

Single Anemones
Forward Anemones
Persian Iris
Spring Crocus

Single Yellow Gilliflower
Single Liverwort
Winter Aconite
Hepaticas

MARCH.

Bulbous Iris
Anemones of all sorts
Spring Cyclamens
Liverwort of all sorts
Daffodils
Crowfoots
Spring Crocus

Hyacinths of all sorts
Jonquils
Yellow Gilliflower
Narcissus of several kinds
Forward Bears'-ears
Forward Tulips
Single Primroses of divers colors

APRIL.

Daisies
Yellow Gilliflowers
Narcissus of all sorts
Forward Bears'-ear
Spring Cyclamens
Crocus, otherwise called Saffron-flowers
Anemones of all sorts
Iris
Pansies
Daffodils

Double Liverworts
Primroses
Honeysuckles
Tulips
Hyacinths
Single Jonquils
Crown-Imperial
Yellow Gilliflowers, double and single
Pasque-Flowers
March Violets

MAY.

Anemones
Gilliflowers of all sorts
Yellow Gilliflowers
Columbines
Asphodils
Orange, or flame-colored Lilies
Double Jacea, a sort of Lychnis
Cyanuses of all sorts
Hyacinths
Day Lilies
Bastard Dittany
Daisies
Lily of the Valley

Mountain Pinks
Pansies
Peonies of all sorts
Ranunculuses of all sorts
Some Irises: as those which we call the Bulbous Iris, and the Chamæ-Iris
Italian Spiderwort, a sort of Asphodil
Poet's Pinks
Backward Tulips
Julians, otherwise called English Gilliflowers

JUNE.

Snap-dragons of all sorts
Wild Tansies
Pinks, otherwise called Lychnises
Irises
Roses
Tuberoses
Pansies
Larkspur
Great Daisies
Climbers
Cyanuses of all sorts
Foxgloves of all sorts
Mountain Lilies
Gilliflowers of all sorts
Monk's-hoods
Pinks of all sorts
Candy-tufts
Poppies

JULY.

Jessamine
Spanish Brown
Basils
Bell-flowers
Indian Jacea
Great Daisies
Monk's-hoods
Pinks
Scabiuses
Nigellas
Cyclamens
Lobel's Catch-flies
Lilies of all sorts
Apples of Love
Comfrey
Poppies
Snap-dragons
Double Marigolds
Amaranthuses
Hellebore
Ox-eyes
Pinks of the Poets
Bee-flowers
Sea-hollies
Foxgloves
Wild Poppies
Everlastings
Roses
Dittanies
Bindweeds
Lilies of St. Bruno
Tricolors
Squills
Motherworts
Climbers
Oculus Christi
Camomile
Sunflowers
Belvederes
Gilliflowers of all sorts
Thorn-apple
Valerian

AUGUST.

Oculus Christi, otherwise called Starwort
Belvederes
Climbers of all sorts
Apples of Love
Marvels of Peru
Pansies
Ranunculuses
Double Marigolds
Candy-tufts
Autumn Cyclamens
Jessamines
Sunflowers, vivacious and annual
Indian Narcissus
Foxgloves
Cyclamens
Passion-flowers
Everlastings
Tuberoses
Monk's-hood
Indian Pinks of all kinds
Bindweed
Passvelours
Great Daisies
White Bell-flower
Autumnal Meadow Saffron
Gilliflowers

SEPTEMBER.

Tricolors
Love-apples
Marvel of Peru
Monk's-hood
Narcissus of Portugal
Snap-dragons
Oculus Christi
Basils
Belvederes
Great Daisies
Double Marigolds
Monthly Roses
Tuberoses
Amaryllis
Autumnal Narcissus
White Bell-flowers
Indian Pinks
Indian Roses
Amaranthus
Pansies
Passion-flower
Autumnal Crocus
Thorn-apple
Carnations
Ranunculuses planted in May
Colchicums

OCTOBER.

Tricolors
Oculus Christi
Snap-dragons
Colchicums
Autumn Crocus
Autumnal Cyclamens
Monk's-hood
Indian Pinks
Pansies that were sown in August
Passion-flower
Passvelours
Double Marigolds
Some Pinks
Amaryllis
Autumnal Narcissus

NOVEMBER.

Snap-dragons
Double and Single Gilliflowers
Great Daisies
Pansies sown in August
Monthly Roses
Double Violets
Single Anemones of all sorts
Winter Cyclamens
Forward Hellebore
Golden Rod

Rabbits are an intolerable nuisance in a flower garden, and in some country places they abound most destructively. A light wire fence about two feet high, closely lattice-worked, or a net of the same height, carried round the garden, is a sure defense from these marauders. But where these conveniences are unattainable, there are other modes which answer the purpose, but they require a little trouble and patience.

It is the well-known nature of Rabbits and Hares to dislike climbing or entangling their feet; and very simple inventions deter them from attempting to gnaw the roots and hearts of flowers. They will not walk upon straw or ashes strewed thickly round any plant: they equally dislike a fence of sticks placed round a plot, with bits of white paper or card fastened to each stick; or a string carried round the sticks a foot or two high. If they cannot creep under a slight fence, they never attempt to leap over it. If a stick is run into the ground close to a plant, and other sticks are slanted from the ground towards the center, the plant will remain untouched, be the frost of ever so long duration.

Snails are disagreeable intruders, but the following method is an exterminating war of short duration:—

Throw cabbage leaves upon your borders over night; in the morning, early, you will find them covered underneath with snails, which have taken refuge there. Thus they are easily taken and destroyed.

Earwigs are taken in great numbers by hanging gallipots, tubes, or any such receptacle, upon low sticks in the borders over night. In these they shelter themselves, and are consequently victimized in the morning. The gallipots, broken bottles, &c., should be placed upon the stick like a man's hat, that the vermin may ascend into them.

Ants are very great enemies to flowers; but I know no method of attacking them, except in their own strongholds, which I have always done with cruel intrepidity and success. My only plan was to lay open the little ant-hill, and pour boiling water upon the busy insects, which destroyed at once the commonwealth, and the eggs deposited within the mound. In some places ants are extremely large and abundant, and they quickly destroy the beauty of a flower by attacking its root and heart.*

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* The Emperor Pagonatus, who wrote a treatise upon agriculture, assures us, that to clear a garden of ants, we should burn empty snail shells with storax wood, and throw the ashes upon the ant-hills, which obliges them to remove. I never tried this method.

Mildew and blight infest roses and honey-suckles. Soap-suds thrown over rose bushes; heavy waterings with tobacco-water, or the water in which potatoes have been boiled, is successful in a degree, but the best way is a very troublesome one to persevere in. Pinch every leaf well which curls up, by which you may know a small maggot is deposited therein. By so doing you destroy the germ of a thousand little monsters.

Mildew and blight come from the east; therefore honeysuckles should be sheltered from that aspect; for, as they rise and spread widely, they are not so manageable as a rose-bush. A mass of luxuriant honeysuckles is beautiful to the eye and delicious in fragrance: but covered with mildew, it is a blackened and miserable object. Mildew, fortunately, does not make its appearance every spring; but once in four or five years it comes as a plague, to desolate the garden. A great deal may be raked away if taken off as soon as it spreads its cobwebs over these lovely flowers; but it should be done without delay.

I cannot lay too great stress upon the neatness in which a lady's garden should be kept. If it is not beautifully neat, it is nothing. For this reason, keep every plant distinct in the flower-beds; let every tall flower be well staked, that the wind may not blow it prostrate; rake away dead leaves from the beds, and trim every flower-root from discolored leaves, weeds, &c.; remove all weeds and stones the moment they appear, and clear away decaying stems, which are so littering and offensive to the eye. There is always some employment of this kind for every week in the year.

Old iron rods, both large and small, are to be procured cheap at the ironmongers. These old rusty rods, painted green, or lead color, are excellent stakes for supporting flowers, and do not wear out. The slighter rods are very firm upright supporters for Carnations, Pinks, &c., while the taller and larger rods are the firmest and best poles for hollyhocks, sunflowers, and the larger class of plants. Fix the flower stem to its stake with string, or the tape of the bass matting, soaked in water to prevent its cracking, and tie it sufficiently tight to prevent the wind tearing it from its position. Tie the large stems in three places for security.

The term *Deciduous,* applied to shrubs, signifies that they shed their leaves every winter.

Herbaceous plants, signify those plants whose roots are not woody, such as stocks, wallflowers, &c. &c.

Fibrous-rooted plants, are those whose roots shoot out small fibers, such as Polyanthuses, violets, &c.

Tuberous-rooted plants, signify those roots which form and grow into little tubes, such as Anemones, Ranunculuses, &c.

PERENNIALS.

Perennials are flowers of many years' duration; and they multiply themselves most abundantly by suckers, offsets, parting the roots, &c. They require little trouble beyond taking care to renew the soil every year or two by a somewhat plentiful supply from the compost heap; and by separating the offsets, and parting the roots in autumn, to strengthen the mother plant. When the flowers are past and the stems have decayed, then the operation may take place. Choose a showery day for transplanting the roots, or give them a moderate watering to fix them in their fresh places. When you transplant a flower root, dig a hole with your trowel sufficiently large to give the fibers room to lie freely and evenly in the ground.

I have, throughout my little work, laid great stress upon possessing a heap of compost, ready to apply to roots and shrubs every spring and autumn. Wherever the soil is good the flowers will bloom handsomely; and no lady will be disappointed of that pleasure, if a compost heap forms one essential, in a hidden corner of the flower garden. If you raise your perennials from seed, sow it in the last week in March in a bed of light earth, in the open ground. Let the bed be in a genial, warm situation, and divide it into small compartments; a compartment for each sort of seed.

Sow the seed thin, and rake or break the earth over them finely. Let the larger seed be sown half an inch deep, and the smaller seed a quarter of an inch. Water the beds in dry weather often with a watering pot, not a jug. The rose of the watering pot distributes the water equally among the seedlings; whereas, water dashed upon them from a jug falls in masses, and forms holes in the light earth, besides prostrating the delicate seedling.

About the end of May, the seedlings will be fit to remove into another nursery bed, to gain strength till October; or be planted at once where they are to remain. Put the plants six inches apart, and water them moderately, to settle the earth about their roots.

But it is rarely required to sow seed for perennial plants,—they multiply so vigorously and quickly of themselves, by offsets; and cuttings may be made of the flower stalks in May and June in profusion.

The double *Scarlet lychnis*, and those plants which rise with firm flower stems, make excellent cuttings, and grow freely when planted in moist weather. Double *Rockets*, *Lychnidea*, and many others, succeed well.

Carnation and *pink* seedlings must be taken great care of. They will be ready to plant out about the middle of June, and as innumerable varieties spring from sowing seed, they should be planted carefully in a bed by themselves six inches asunder, and they will flower the following year, when you can choose the colors you most approve. Carnations properly rank under the head of biennials; but pinks are strictly perennial plants, and much has been written upon this hardy and beautiful flower. It comes originally from a temperate climate, therefore the pink loves shade: the fervid sunbeams cause its flowers to languish and droop. You may give them an eastern aspect.

Be careful to watch pinks when they are budding, and do not allow two buds to grow side by side. Pinch off the smaller bud, which would only weaken its companion. Keep the plants free from decayed leaves, and gently stir the earth round them occasionally with your small trowel. This operation refreshes them. Stake them neatly, that they may not fall prostrate after rain.

If you wish to preserve any particular pink, let it grow in a pot, or upon a raised platform, that it may be placed beyond the reach of hares, rabbits, or poultry, and be more easily sheltered from long and severe frost or rains in winter, and from the dry heats in summer, either of which destroys the beauty of the flower. The pots can be sunk in the ground in fine weather. Do not hide your pinks among larger flowers: let them be distinctly seen. If you water pinks too much, their roots become rotten; and if you suffer them to be too dry, they become diseased. Beware of extremes. The best rule is to keep them just moist. A fine pink should not have sharp-pointed flower leaves; they should be round and even at their edges, and the colors should be well defined, not running one into the other. The flower should be large; it should possess a great many leaves, and form a sort of dome. Piping and slipping, is the most expeditious mode of propagating plants from any selected pink.

Pansies, *violets*, &c., are very easily propagated by parting the roots when the flowers are past. Pansies are very beautiful flowers; and cuttings of their young shoots will grow very freely if kept moist and shaded for some little time. By refreshing the soil every year, you insure large flowers. Pansies and violets bloom early in the spring.

Hepaticas must be parted like violets. They appear so very early in the year that no garden should exist without these gay and modest flowers. The leaves appear after the flower has past away.

The *Polyanthus* blooms among the early tribe. In planting this flower, be careful to insert the roots deep in the soil, so that the leaves may rest upon it, for the roots are produced high upon the stem, and those roots must be enabled to shoot into the soil. The polyanthus, like almost every other flower, loves a good soil, with a mixture of sand.

In dividing these fibrous-rooted perennial plants, take only the strong offsets, with plenty of fibers attached to them.

Polyanthuses, auriculas, double daisies, double camomile, London pride, violets, hepaticas, thrift, primroses, gentianella, &c., succeed well, taken up and divided in September, for they will all have done flowering by that time. Indeed, all perennial fibrous-rooted plants may be taken up in October to have their roots parted, and the soil refreshed round them.

Peonies, and all knob-rooted plants, should be taken up in October to part their roots and transplant them to their intended positions.

The saxifrage has very small roots, which are apt to be lost in borders if not very carefully looked after. Like the anemone, &c., sift the earth well for them.

Dahlias require a word or two upon their culture. They love sand, therefore allow them plenty of it, but do not put manure to their roots, which throws them into luxuriant leaf and stem, to the deterioration of the flower. Peat mould is good, if you can obtain it, to mix with the sand, as it assists the flower in developing stripes and spots. Train each plant upright, upon one stem only, and give it a strong stake to support its weight, which soon succumbs under gusts of wind. Plant them in open and airy places. When the stems become black, take them up, separate the roots, and plunge them into a box of ashes, barley chaff, or sand, to protect them through the winter. Plant them out in May.

Dahlias grow from cuttings, which require care and a hot-bed to do well, but they multiply themselves very sufficiently without that trouble.

It is a great perfection to see every tall plant in a flower-garden well staked, and trimmed from dead straggling shoots. Let no branches trail upon the border, but, as in the ease of Chrysanthemums, cut away the lowest branches or shoots, that each plant may stand erect and neat in its order, without intermeddling in its neighbor's concerns. There will be plenty of employment all through the summer in watching the growth of your plants, in cutting away decayed stems, and trimming off dead leaves. Let nothing remain in the flower's way after the brightness of its bloom has past by: cut off the drooping flower before it runs to seed, which only tends to weaken the other flowers, and leave only the finest flower to produce seed on each plant.

Perennials grow remarkably fine always in newly turned-up ground, but they gradually degenerate if they are allowed to remain above two years without replacing the substance they have exhausted in the soil. Add every year to that substance, by liberal supplies from the compost heap.

Be careful to multiply your supply of jasmines, honeysuckles, &c., by cuttings in their due season.

I subjoin a list of the hardier sorts of fibrous rooted Perennials, eligible to adorn a garden, from which my readers may stock their borders.

LIST OF HARDY PERENNIALS.

Aster, or Starwort
- Large blue Alpine
- Common Starwort, or Michaelmas Daisy
- Early Pyrenean
- Blue Italian Starwort
- Catesby's Starwort
- Dwarf narrow-leaved Starwort
- Midsummer Starwort
- Autumnal white Starwort, with broad leaves

Tripolian Starwort
- Divaricated-branched
- Virginian Starwort, with spiked blue flowers
- Early blue Starwort
- Rose Starwort
- Latest Starwort, large blue flowers
- New England Starwort
- Red-flowering

Apocynum, Dogsbane
- Red-flowering
- Orange-colored
- Syrian

Arum, Italian large-veined leaf

Asclepias, Swallow-wort
- White
- Yellow

Astragalus, Milk-vetch

Alysson, White
- Yellow
- Violet

Borage, the Eastern

Bachelor's Button
- Double red
- Double white

Double Ragged Robin

Campanula, or Bell-flower
- Double blue
- Double white
- Double blue, and white nettle-leaved

Caltha, double-flowered
- Marigold

Cassia of Maryland

Pinks, double pheasant's eye
- Dobson
- Deptford
- Cob white
- Red cob
- White stock
- Damask
- Mountain
- Matted
- Old man's head
- Painted lady
- Clove pink, and many other varieties

Stock July-flower, the Brompton
- Double scarlet Brompton
- Single scarlet
- Purple
- White Brompton
- Queen stock
- Purple double
- Striped double
- Single of each sort
- Twickenham stock

Lichnidea, early blue
- Spotted-stalked, with purple spikes of flowers
- Virginia, with large umbels
- Low trailing purple
- Carolina, with stiff shining leaves, and deeper purple flowers

Cyanus, broad-leaved
- Narrow-leaved

Lychnis, or Campion
- Single scarlet lychnis
- Double scarlet lychnis
- Catchfly, double flowers

Hepaticas, single white
- Single blue
- Single red
- Double red
- Double blue

Lineria, toad flax
- Purple
- Yellow

Bee Larkspur

Fraxinella, white
- Red

Gentiania, great yellow

Gentianella, blue

Globularia, blue daisy

Fox-glove, red
- White
- Iron-colored

Perennial Sun-flower
Double yellow, and several other species.
Cyclamen, red
White
Goldy Locks
Chelone, white
Red
Lily of the Valley, common
Double-flowering
Solomon's Seal, single
Double
Filapendula, or Dropwort
Columbines, common blue
Double red
Double white
Double striped
Starry, double and single
Early-flowering Canada
Thalictrum, feathered columbines
Pulsatilla, blue Pasque flower
Orobus, bitter vetch
Saxifrage, double white
Thick-leaved
Purple
Veronica, upright blue
Dwarf blue
Hungarian
Blush
Golden Rod, many species
Valerian, red garden Valerian
White garden
Rudbekia, American sun-flower
Dwarf Virginia, with large yellow flowers
Dwarf Carolina, with narrow red reflexed petals and purple florets
Virginia, with yellow rays and red florets
Tall yellow, with purple stalks and heart-shaped leaves
Taller, with yellow flowers and large five-lobed leaves, and those on the stalks single
Tallest yellow, with narrower leaves, which are all of five lobes
Pulmonaria, Lungwort
Common
American

Monarda, purple
Scarlet
Ephemeron, Spider-wort, or flowers of a day
White
Blue
Jacca, American knapweed
Primrose, double yellow
Double scarlet
White
Polyanthus, many varieties
Auriculas, many varieties
Violets, double blue
Double white
Double red
Russian
Banksia
Violet, the Major
London-pride, or None-so-pretty
Day-lily, red
Yellow
Fumitory, the yellow
White
Bulbous-rooted
American forked
Aconite, Monk's-hood, or Wolf's-bane
Blue Monk's-hood
Yellow
White
Wholesome Wolf's-bane
Winter Aconite
Hellebore, or Bear's-foot
Common black hellebore
Green-flowered
White Hellebore
Christmas Rose
Geranium, Crane's-bill
Bloody Crane's-bill
Blue
Roman
Bladder-cupped
Daisies, common double red garden daisy
White
Double variegated
Cock's-comb daisies, white and red
Hen and chicken, white and red
Dahlias, many varieties
Peony, double red
Double white

- Double purple
- Male, with large single flowers
- Sweet-smelling Portugal
- Double rose-colored
- *Silphium*, bastard Chrysanthemum
- *Iris*, Fleur-de-lis, or flags
  - The German violet-colored
  - Variegated, or Hungarian, purple and yellow
  - Chalcedonian iris
  - Greater Dalmatian iris
  - There are several other varieties of Irises, all very hardy and very beautiful plants
- *Cardinal Flowers*, scarlet
  - Blue
- *Rocket*, double white
- *Balm of Gilead*, sweet-scented; must be sheltered in winter
- *Everlasting Pea*
- *Eupatorium*, several varieties
- *Eryngo*, blue
  - White
  - Mountain, purple and violet
  - There are some other varieties
- *Snap Dragon*, or Calf's-snout
  - Red
  - White
  - Variegated
- *Moth Mullein*
- *Angelica*
- *Asphodelus*, King's-spear
- *Lupins*, perennial, blue-flowered
- *Ononis*, Rest-har
  - Large yellow-flowered
- *Tradescantia*, or Virginia Spiderwort

The Saxifrage is propagated by cuttings and offsets, which the roots produce abundantly. Take the offsets and plant them out in August. The double white saxifrage is a beautiful flower, and blooms early in the spring. The pyramidal saxifrage is a very handsome decorative flower, but it must be planted in little clumps to make a showy appearance.

October is the busy month for transplanting and removing the offsets of all perennial and biennial plants. In this month every flower of summer has passed away, and the garden is free to receive all new arrangements in its future dispositions. Golden rod, Michaelmas daisies, everlasting sun-flower, and other branching plants, will require taking up every four years, to part the main root into separate plants, and replace them in the ground again. Peonies, lilies of the valley, fraxinellas, monk's-hood, flag-leaved irises, &c., must be increased or removed when required. All this is most effectually done in October.

In the same month, finish all that is to be effected among the perennial tribe. Campanulas, lychnises, polyanthuses, violets, aconites, cyclamens, gentianella, yellow gentian, double daisies, hepaticas, saxifrage, &c., must be attended to, and propagated, by dividing the roots, before October closes. November is the season of fogs and severe frosts: if a lady is prudent, she will perform all these needful operations in October, and November will have no alarms for her.

All the double-flowering plants, such as double sweet-william, double rockets, double scarlet lychnis, &c., should be placed in sheltered situations in October, to weather out the storms of winter. Double flowers are very handsome, and deserve a little care.

The most charming little perennial flower which can adorn a lady's garden is the scarlet verbena, but it is very difficult to preserve through the winter. Its beauty, however, repays the care which may be bestowed upon it. This tender plant—the only really tender root which I admit into my work—is not only desirable from its fine, full scarlet blossoms, but it blooms from April to November. The scarlet verbena loves a rich, light, dry border or bed, in a sunny situation; they delight also in rock-work, where they have been known to exist through the winter. Plant the roots about six inches apart in the middle of April, and keep pegging down the shoots as they throw themselves along the bed. A profusion of flowers and plants are produced by this means. A bed or border sloping to the south is the best situation for the scarlet verbena.

CHAPTER IV

BULBS AND TUBEROUS-ROOTED FLOWERS—PERENNIALS.

I SHALL give the bulbous and tuberous-rooted flowers a chapter to themselves. They are the earliest treasures of the flower-garden, and deserve especial notice. There was a period when two hundred pounds was offered for a hyacinth root, and even the enormous sum of six hundred pounds was given for a *Semper Augustus* tulip, by the Dutch tulip fanciers. But though a few florists are still particularly nice with respect to their bulbs, the time is past for paying such splendid prices; and such an inexhaustible variety offer themselves to our notice now, that we are somewhat puzzled in making a choice collection. Seed produces immense numbers yearly, and an infinite variety of new colors in each species. The florist is lost in admiration of the magnificent blooms which meet the eye in every flower-garden which is carefully attended to.

Bulbs love a mixture of garden soil and sand, well mixed, and dug about two spades deep to lighten it. Break the mould fine, and rake the surface even. Plant the bulbs four inches deep, and let them be six inches apart, placing the bulb with care into the dibbled hole, and pressing the earth gently round each. All bulbs should be replanted in September, and taken out of the ground when they have done flowering. When the leaves and stems decay, dig them neatly up, in dry weather, with your garden fork; take the offsets carefully from the main root; spread them out to dry on a mat, and put them in a cool dry place to plant again in September.

The common bulbs, such as *Snowdrops*, *Crocuses*, &c., may be left two or three years untouched; but at the end of that period take them up, to separate the offsets and small roots from the mother plants. You can replant them immediately, taking care to thin the clumps, and separate each root six inches from its neighbor, that they may rise healthy, and throw out fine blooms.

Narcissuses, *Jonquils*, and *Irises*, may also remain two years untouched; but if annually taken up, they will flower finer, and for these reasons.

By taking up your bulbs as soon as their leaves and stems decay, it not only allows you to separate the offsets, which weaken the parent bulb, but it prevents their receiving any damage from long drought, or the equally destructive moisture of heavy rains, which would set them growing again before their time, and exhaust them. The two or three months in which they are laid by contributes to their strength, by allowing them that period of complete rest.

The autumn-flowering bulbs, such as the *Colchicums*, the *Autumnal Crocus*, the *Yellow Autumnal Narcissus*, &c., should be taken up in May or early in June, when they are at rest. Transplant them now, if you wish to remove them; part the offsets, and plant them six inches apart. If you keep them out of the ground, put them in a dry, shady place, till the middle of July or August, when you must plant them again, to blow in the autumn.

Be careful to take up bulbs as soon as the leaves decay. If they are incautiously left in the ground beyond that period, they begin to form the bud for the next year's flowers; and the check of a removal would injure them. They might produce flowers in due time, but they would be weakly.

The little offsets will not flower for a year or two. They may be consigned to a nursery-bed to remain for that time, in order to swell and strengthen by themselves.

If you wish to procure new varieties from seed, it must be sown in August. The healthiest flower-stalk should be chosen, and deposited in pots or boxes of fine light earth, for the convenience of removing under shelter in wet or frost. Keep the pots or boxes in the shade during the heats, but, as the cold weather advances, remove them to a warm sheltered spot. Litter will shelter them from the frost, if you cannot command any other covering. The plants will appear early the following May: they must be kept very clear from weeds, and be moderately watered in dry weather. These seedlings must be transplanted every summer to be thinned, and placed further apart from each other till they blow, when they may be removed into the flower-beds.

This method is troublesome, and requires patience. Tulip seedlings are seven years before they flower, and a lady may find her patience severely tried in waiting for their blooms. Seven years is a large portion of human life. If you can persevere, however, you will be rewarded by beautiful varieties of new colors and stripes.

Fine tulips should have six leaves, three on the outside and three on the inside, and the former should be broader than the latter. The stripes upon the tulip should also be defined and distinct, not mixing with the ground tints.

Hyacinth seedlings are four years before they flower; this is not so harassing a period as the Tulip requires; but every pleasure has its counterbalance. If you will have fine flowers, you must wait for them. These bulbs love a sunny situation.

The *Orchis* tribe prefer a moist ground and a northern aspect. Columella says, that when orchis bulbs are sown in autumn, they germinate and bear flowers in April.

The *Colchicums* or narcissus are hardy bulbs, and will grow in any sort of ground; only, the better the soil is, the finer they will flower.

The *Guernsey Lily* and *Belladonna* will not thrive in the open ground, therefore it is needless to speak of those very splendid flowers.

The Lily of the Valley, though scarcely to be classed among the lily tribe, is a beautiful flower, and as fragrant as it is lovely. They must be multiplied by dividing the roots, which should be parted with a knife, as they are very intricate: do this in December. Plant them three inches deep in the ground, and disturb them as little as you can help, as they do not like to be often moved. They are larger in their flowers when grown in the shade, but they are sweeter in perfume in the sun's full rays. Thin broad leaves are sufficient shelter to the flowers.

All bulbs love salt: be careful, therefore, to throw a portion of common salt or brine upon your compost heap. My cousin, Cuthbert W. Johnson, Esq., in his "Observations on the Employment of Salt," quotes a passage in a letter addressed to him by Mr. Thomas Hogg, the eminent florist, upon the advantages of salt in the cultivation of flowers. I will transcribe it here:—

"From the few experiments that I have tried with salt as a garden manure, I am fully prepared to bear testimony to its usefulness. In a treatise upon flowers, published about six years since, I remarked, that the application of salt, and its utility as a manure, was yet imperfectly understood. It is a matter of uncertainty, whether it acts directly as a manure, or only as a kind of spice or seasoning, thereby rendering the soil a more palatable food for plants.

"The idea that first suggested itself to my mind, arose from contemplating the successful culture of hyacinths in Holland. This root, though not indigenous to the country, may be said to be completely naturalized in the neighborhood of Haerlem, where it grows luxuriantly in a deep, sandy, alluvial soil. yet one great cause of its free growth, I considered, was owing to the saline atmosphere: this induced me to mix salt in the compost; and I am satisfied that no hyacinths will grow well at a distance from the sea without it. I am also of opinion, that the numerous bulbous tribe of Amaryllisses, especially those from the Cape of Good Hope; Ixias, Aliums, which include Onions, Garlic, Shalots, &c., Anemones, various species of the Lily Antholyza, Colchicum, Crinum, Cyclamens, Narcissus, Iris, Gladiolus, Ranunculus, Scilla, and many others, should either have salt or sea-sand in the mould used for them.

"I invariably use salt as an ingredient in my compost for carnations; a plant which, like wheat, requires substantial soil, and all the strength and heat of the summer, to bring it to perfection; and I believe I might say, without boasting, that few excel me in blooming that flower."

Colchicums, the Autumnal Narcissus, Amaryllis, and the Autumn Crocus, should be planted in August, to blow in September and October.

Replant all the bulbous tribe by the end of October, at the latest. Choose a mild, dry day to put them in the ground, and let each bulb be six or nine inches distant from its companion. All bulbs become weak by being placed too closely together, the soil becoming soon exhausted.

Bulbs of the more choice varieties are better attended to if they can be placed in beds or compartments by themselves; for they are more easily sheltered from frost and rain when in a body. The eye, also, is more delighted by the beautiful variety *en masse.* Their favorite soil, too, can be composed and preserved for them more exclusively, unexhausted by the roots of larger plants around them. Some of the commoner sorts can be planted out in patches, to add to the gay appearance of the borders, among the spring flowers.

Martagons, orange lilies, and bulbs, of tall growth, should never be planted among the smaller tribe; their large bulbs would exhaust the soil, and weaken the smaller flowers. They look very handsome in borders and plots, placed near, or in, their center.

LIST OF BULBOUS AND TUBEROUS-ROOTED FLOWERS.

- *Amaryllis*, comprising the autumnal yellow Narcissus
  - Spring ditto
- *Crocus vernus*, or spring-flowering crocus
  - Common yellow
  - Large yellow
  - Yellow, with black stripes
  - White
  - White, with blue stripes
  - Blue, with white stripes
  - Deep blue
  - Light blue
  - White, with purple bottom
  - Scotch, or black and white striped
  - Cream-colored
- *Autumnal flowering Crocus*, of the following varieties:—
  - True saffron crocus, with bluish flower, and golden stigma, which is the saffron
  - Common autumnal crocus, with deep blue flowers
  - With light blue flowers
  - Many-flowered
- *Snowdrop*, the small spring flowering
  - Common single
  - Double
- *Leucojum*, or great summer snowdrop
  - Great summer snowdrop with angular stalk: a foot high, and two or three flowers in each sheath
  - Taller great snowdrop, with many flowers
- *Ornithogalum*, or Star of Bethlehem
  - Great white pyramidal, with narrow leaves
  - White, with broadsword-shaped leaves spreading on the ground
  - Yellow
  - Pyrenean, with whitish green flowers
  - Star of Naples, with hanging flowers
  - Umbellated, producing its flowers in umbels, or spreading bunches, at the top of the stalk
  - Low yellow umbellated
- *Erythronium*, Dens canis, or dog's tooth
  - Round-leaved, with red flowers
  - Same, with white flowers
  - The same, yellow
  - Long narrow-leaved, with purple and with white flowers
  - Grape hyacinth
  - Purple
  - Blue
  - White
  - Musk hyacinth
  - White
  - Ash-colored
  - Blue feathered hyacinth
  - Purple
  - Musky, or sweet-scented, with full purple flowers
  - The same, with large purple and yellow flowers
  - Great African Muscaria, with sulphur-colored flower
- *Fritillaria* checkered tulip
  - Early purple, variegated, or checkered with white
  - Black, checkered with yellow spots
  - Yellow, checkered with purple
  - Dark purple, with yellow spots, and flowers growing in an umbel
  - Persian lily, with tall stalks, and dark purple flowers growing in a pyramid
  - Branching Persian lily
- *Corona Imperialis*, crown imperial, a species of Fritillaria
  - Common red
  - Common yellow
  - Yellow-striped
  - Sulphur-colored
  - Large-flowering
  - Double of each variety
  - Crown upon crown, or with two whorls of flowers
  - Triple crown upon crown, or with three tiers of flowers one above another
  - Gold-striped leaved
  - Silver-striped leaved

- *Tulip*, early dwarf tulip
  - Tall, or most common tulip
  - Early, yellow and red striped
  - White and red striped
  - White and purple striped
  - White and rose striped
  - Tall, or late-flowering, with white bottoms, striped with brown
  - White bottoms, striped with violet or black brown
  - White bottoms, striped with red or vermilion
  - Yellow bottoms, striped with different colors, called Bizarres
- *Double Tulip*, yellow and red
  - White and red
- *Gladiolus*, corn flag, or sword lily, common, with sword-shaped leaves, and a reddish purple flower ranged on one side of the stalk
  - The same, with white flowers
  - Italian with reddish flowers ranged on both sides of the stalk
  - The same, with white flowers
  - Great red of Byzantium
  - Narrow grassy-leaved, and a flesh-colored flower, with channeled, long, narrow, four-angled leaves, and two bell-shaped flowers on the stalk
  - Great Indian
- *Anemone*, wood anemone, with blue flowers
  - White flowers
  - Red flowers
  - Double white
- *Garden Double Anemone*, with crimson flowers
  - Purple
  - Red
  - Blue
  - White
  - Red and white striped
  - Red, white, and purple
  - Rose and white
  - Blue, striped with white
- *Ranunculus*, Turkey with a single stalk, and large double blood-red flower
  - Yellow-flowered
  - Persian, with branching stalk, and large double flowers of innumerable varieties, of which there are
  - Very double flowers
  - Semi, or half double
  - (The double are most beautiful, propagated by offsets)
- *Pancratium*, sea daffodil
  - Common white sea Narcissus, with many flowers in a sheath, and tongue-shaped leaves
  - Sclavonian, with taller stems and many white flowers, and sword-shaped leaves
  - Broad-leaved American, with large white flowers, eight or ten in a sheath
  - Mexican, with two flowers
  - Ceylon, with one flower
- *Moly* (*Allium*), species of garlic producing flowers
  - Broad-leaved yellow
  - Great broad-leaved, with lily flowers
  - Broad-leaved, with white flowers in large round umbels
  - Smaller white umbellated
  - Purple
  - Rose-colored
- *Fumaria bulbosa*, or bulbous-rooted fumitory
  - Greater purple
  - Hollow-rooted
  - American, with a forked flower
- *Narcissus*, or daffodil, common double yellow daffodil
  - Single yellow, with the middle cup as long as the petals
  - White, with yellow cups
  - Double, with several cups, one within another
  - Common white narcissus, with single flowers
  - Double white narcissus
  - Incomparable, or great nonsuch, with double flowers
  - With single flowers
  - Hoop petticoat narcissus, or rush-leaved daffodil, with the middle cup larger than the petals, and very broad at the brim

Daffodil, with white reflexed petals, and golden cups
White daffodil, with purple cups
Polyanthus Narcissus, having many small flowers on a stalk, from the same sheath. Of this are the following varieties:—
White, with white cups
Yellow, with yellow cups
White, with yellow cups
White, with orange cups
White, with sulphur-colored cups
Yellow, with orange cups
Yellow, with sulphur-colored cups
With several intermediate varieties
Autumnal narcissus
quil, common single
Large single
Common double
Double, with large round roots
ium, the lily, common white lily
With spotted or striped flowers
With double flowers
With striped leaves
White lily, with hanging or pendent flowers
Common orange lily, with large single flowers
With double flowers
With striped leaves
Fiery, bulb-bearing lily, producing bulbs at the joints of the stalks
Common narrow-leaved
Great broad-leaved
Many-flowered
Hoary
Martagon lily, sometimes called Turk's cap, from the reflexed position of their flower-leaves. There are many varieties, and which differ from the other sorts of lilies in having the petals of their flowers reflexed, or turned backward. The varieties are—
Common red martagon, with very narrow sparsed leaves, or such as grow without order all over the flower-stalk
Double martagon
White
Double white
White spotted
Scarlet, with broad sparsed leaves
Bright red, many-flowered, or pompony, with short, grassy, sparsed leaves
Reddish hairy martagon, with leaves growing in whorls round the stalk
Great yellow, with pyramidal flowers, spotted
Purple, with dark spots, and broad leaves in whorls round the stalk, or most common Turk's-cap
White spotted Turk's-cap
Canada martagon, with yellowish large flowers spotted, and leaves in whorls
Campscatense martagon, with erect bell-shaped flowers
Philadelphia martagon, with two erect bright purple flowers
Squills, sea onion, or lily hyacinth, common lily hyacinth, with a lily root and blue flower
Peruvian, or broad-leaved hyacinth of Peru, with blue flowers
With white flowers
Early white starry hyacinth
Blue
Autumnal starry hyacinth
Larger starry blue hyacinth of Byzantium
Purple star-flower of Peru
Italian blue-spiked star-flower
Asphodel lily, African blue, with a tuberous root
Tuberose, or Indian tuberous hyacinth. It produces a small stem three or four feet high, adorned with many white flowers of great fragrance.
The varieties are,—
Fine double tuberose
Single tuberose
Small-flowered
Striped-leaved
Iris bulbosa, or bulbous Iris, Persian with three erect blue petals called standards, and three reflexed petals called falls, which

are variegated, called Persian bulbous iris, with a variegated flower
Common narrow-leaved bulbous iris, with a blue flower
White
Yellow
Blue, with white falls
Blue, with yellow falls
Greater broad-leaved bulbous iris, with a deep blue flower
Bright purple
Deep purple
Variegated
Great, with broad and almost plain or flat leaves, with blue flowers
Purple
Of the above there are many intermediate varieties

Hyacinth, eastern, with large flowers. Of these there are many varieties, and of which there are innumerable intermediate shades or tints of color

Of double sorts there are,—
- Blues
- Purple blues
- Agatha blues
- Whites
- Whites, with yellow eyes
- Whites, with red eyes
- Whites, with violet or purple eyes
- Whites, with rose-colored eyes
- Whites, with scarlet eyes
- Reds
- Incarnate, flesh or rose-colored

Of single sorts there are,—
- Blues, of various shades, as above
- Whites
- Reds
- Rose-colored
- With many intermediate shades or varieties

(*Muscaria*), or musk hyacinth
Ash-colored
White
Obsolete purple
Greater yellow African
Grape hyacinth
Purple
Blue
White
Red
Monstrous flowering, or blue-feathered hyacinth
Comosed, or tufted purple hyacinth
Amethystine blue hyacinth
Nodding, spiked, red hyacinth
Non-script small English hyacinth, or harebells, of the following varieties:—
Common blue flowers arranged on one side of the stalk
White
Bell-shaped blue hyacinth, with flowers on every side of the stalk
Bell-shaped peach-colored, with flowers on one side of the stalk
These are very hardy, propagating by offsets
Hyacinth, with a pale purple flower

Colchicums in variety

Leontice, lion's leaf, largest yellow, with single foot-stalks to the leaves
Smaller pale yellow, with branched foot-stalks to the leaves

Cyclamen, sow-bread, European, or common autumn-flowering, with a purple flower, and angular heart-shaped leaves
The same, with a black flower
The same, with white flowers
Red spring-flowering, with heart-shaped leaves, marbled with white
Entire white, sweet-smelling
Purple winter-flowering, with plain or circular shining green leaves
Purple round-leaved autumn-flowering
Small, or anemone-rooted, with flesh-colored flowers appearing in autumn: these plants have large, round, solid roots; the flowers and leaves rise immediately from the root

Corona Regalis, or royal crown; requires shelter in the winter

Aconite, the winter

Sisyrinchium

AURICULA, RANUNCULUS, ANEMONE.

These early and beautiful flowers deserve peculiar notice, for no garden looks well without them, and their bright tints delight the eye and mind. The commonest kinds are handsome and useful in small clumps, and a little care and trouble will raise superb varieties.

The Auricula loves a soil composed of kitchen-garden mould, sand, and cow-dung, well mixed together; they also like a cool situation. The seed should be sown in September, and when sown give it a gentle watering. By sowing the seed in pots or boxes, you can remove them from heavy rains, &c., without trouble, and shelter them in the outhouses or tool-house. The seed seldom appears under six months, and it has been sometimes a twelvemonth producing itself, therefore be not in despair, but remain patient; these freaks of nature cannot be accounted for. When they flower, you must single out the plants which bear the finest and most choice blooms, and transplant them into pots filled with the compost above described. The common sorts may be planted in the borders, to remain out and shift for themselves. By keeping the fine auriculas in pots, you preserve them through the winter easily, for heavy rains and cutting winds do them harm. You can sink them in their pots during summer in the flower-beds, but let them be sheltered during the winter, if you wish to preserve the blooms uninjured.

Auriculas multiply also by suckers, which grow on their roots. Take off these in February, and plunge them into pots of the mould they like best, to root freely. They will do so in two months. Auriculas should not be too much watered, as it makes them look sickly, and the leaves become yellow. When you pot the auriculas, sink them up to their leaves in the soil, but do not press the mould round the plant, as the flowers bloom finest when the roots touch the sides of the flower pot.

The auricula is esteemed fine that has a low stem, a stalk proportioned to the flower, the eye well opened, and always dry. The glossy, the velvet, and the streaked auriculas are the most admired. The stalk should be decked with many flower-bells, to be handsome and healthy.

Take care to pull off all dead leaves round the plant at all times, that it may appear neat and clean. Neatness is favorable to its perfect growth, as well as decorating it to the eye.

The Ranunculus does not like being mixed up with other flowers, and from this "aristocratic principle" it is always planted in separate knots.

This flower loves sun and warmth. The root must be planted in September, to bloom early in the summer, and it delights in a rich, moist soil, well dug, and raked soft and fine. When you plant them in beds or pots, they must be sunk two inches deep, and dibble the hole with a round, not pointed, dibble. Place the roots four or five inches apart, in the warmest situation in your garden. By planting ranunculuses in pots, you can more easily place them in warm situations, and withdraw them from heavy rains. The more room you give these roots the finer they will grow and blow. If your plots will allow of so doing, let the roots be planted six or seven inches apart. The flowers will repay your care. When ranunculuses in pots have flowered, remove them from the August rains, or take up the roots, to replant in September.

The Ranunculus with the double white flower must not be taken up until September, when it should be taken up quickly, its roots parted, and replanted immediately.

The Yellow Ranunculus with the rue leaf, prefers being potted to being planted in beds.

The Ranunculus propagates by seed as well as offsets. Sow the seed as you do that of the auricula.

The most admired ranunculuses are the white, the golden yellow, the pale yellow, the citron-colored, and the brown red. The red is the least esteemed. The yellow ranunculus speckled with red, is handsome,—also the rose-color with white inside.

Great varieties are obtained by seed.

The Anemones love a light soil, composed of kitchen-garden mould, and sand, and leaf mould, well mixed, and sifted fine. It should, if possible, be composed a year before it is used; the lighter it is the better for anemones.

The seed should be sown in September. The single flowers alone bear seed, which is fit to gather when it appears ready to fly away with the first gust of wind. As soon as the seed is lodged, and raked smoothly into its fine, light bed, strew the bed over with straw or matting, and give it a good watering. In three weeks the seed will begin to rise, when the straw may be removed. The young plants will flower in the following April.

When the roots are to be planted in September, sink them about three inches deep, and six inches apart, that they may come up strong and flower well. Make a hole in the ground for them with your finger, and set them upon the broadest side, with the slit downwards.

Those anemones planted in September will flower in March and April, and the roots planted in May flower in autumn, but the flowers are never so fine.

When anemones have done flowering, it requires some care in taking up the roots, in order to part and put them by till the time for replanting arrives. The roots or flaps are so small and difficult to distinguish, that the earth should be taken up and laid upon a sieve to be sifted, when the flaps will alone remain behind, or the earth may be deposited upon an open newspaper or cloth, and well rubbed with the hand to feel for the minute dark-colored flaps, which may easily escape observation.

The beauty of this flower consists in its thickness and roundness, especially when the great leaves are a little above the thickness of the tuft.

Choose your seed from the finest single anemone, with a broad, round leaf.

The remaining tuberous-rooted flowers are very hardy.

BIENNIALS.

Biennial flowers, as the name implies, are plants that exist only two years. They are propagated by seed, rising the first year, and flowering the second. If they continue another year, they are sickly and languid. The double biennials may be continued by cuttings and slips of the tops, as well as by layers and pipings, though the parent flower dies—but they are not so fine. A lady should have a space of ground allotted to biennial seedlings, so that a fresh succession of plants may be ready to supply the place of those which die away. The seeds should be sown every spring in light, well-dug earth; the young plants should be kept very clean, and some inches apart from each other; and they must be finally transplanted in autumn into the beds where they are intended to remain.

But there is a great uncertainty as to raising the double flowers, therefore it is better to make sure of those you approve by perpetuating them as long as you can, by any root offsets they may throw off,—by pipings, cuttings, or by layers, as before noticed. I subjoin a list of the principal and useful biennials.

LIST OF HARDY BIENNIALS.

- *Canterbury Bells*
  - Blue-flowers
  - White
  - Purple
  - Pyramidal
- *Carnation.* All the varieties, somewhat biennial-perennial.
- *Clary*, Purple-topped
  - Red-topped
- *Colutea*, Æthiopian
- *French Honeysuckle*
  - Red
  - White
- *Globe Thistle*
- *Hollyhocks.* Somewhat biennial-perennial; all the varieties; always by seed
- *Lunaria*, Moonwort or Honesty
- *Mallow* (Tree)
  - Red
  - Scarlet
  - Purple
  - Red, white-bordered
  - Party-colored
  - Variegated
  - Painted Lady
  - Double of each
  - Mule, or Mongrel Sweet-william, or Mule Pink
- *Tree Mallow* (*Lavatera arborea*)
- *Tree Primrose*
- *Night Stock*
- *Poppy*, Yellow-horned (*Chelidonium glaucum*)
- *Rocket*, Dame's violet
  - Single white
  - Double white
  - Double purple
  - Single purple
- *Rose Campion*
  - Red
  - White
- *Scabius*, double
  - Dark purple-flowered
  - Dark-red
  - White
  - Starry purple-flowered
  - Starry white
  - Jagged-leaved starry
- *Stock Gilliflower*
  - Brompton
  - Queen
  - Twickenham
- *Sweet-william*
  - Common upright tall yellow
  - Small-flowered
- *Wall-flower*
  - Yellow-flowered
  - Bloody
  - White
  - Double of each
- *Petunia*
  - White
  - Lilac

When you make your seedling-bed or nursery, cover it over with straw, or fern, or matting, during frost; and to prevent the birds pecking up the seeds, it is requisite to protect the bed by strewing light boughs of thorn bushes over it, or fixing a net upon sticks as a covering, till the plants appear. If cats, dogs or poultry intrude into the flower garden, it is in vain to hope for enjoyment.

Sow your biennial seeds in March, April, or May. I recommend May, because the young plants in that month germ and vegetate quickly, surely, and without requiring defenses from the frost. Plant them out in October, with a ball of earth to each root, where they are to remain.

The Stock Gilliflowers in particular, having long, naked roots, must be planted out very young, otherwise they do not succeed well.

Honesty is a very early, rich-flowering biennial, which requires no care; they shed their seed, rise, and flower without any assistance, in profusion. The only trouble is to weed it out of the beds, that they may not stand in the way of other flowers.

Canterbury Bells are handsome flowers, and will bloom a long time, if you cut off the bells as they decay.

The deep crimson Sweet-williams are most esteemed; though every variety looks well.

Sweet-williams may be increased by layers and cuttings, which is the only sure way of securing the sorts you like; for you may sow seed every year, and not one in a thousand will reward you by coming up double.

Carnations are the pride of a garden, and deserve great care and attention. The common sorts, which are planted in borders, should have a good rich earth about them, and be treated like the pink; but the finer sorts should always be potted, to protect and shelter the plant from hares, rabbits, heavy rains, and severe frost in the winter. Refresh the top of the pots with new soil in June, and keep the plants free from decayed leaves. Gently stir the earth round each plant occasionally; and as plants in pots require more water than if placed in the ground, let the carnations be gently moistened about every other day during dry weather. Let the watering take place in the *evening;* no flower will endure being watered during the heat of a summer's day. Carnations love sand and salt in proper proportions. The brine which is deposited upon the compost heap will answer every purpose of salts, (if it be regularly carried out), without adding common salt: but let this be particularly attended to. The cook should deposit her pickle and brine to good purpose upon the compost heap, instead of splashing it down in front of her kitchen door.

Let each plant be well staked, and neatly tied to its supporter; and do not allow two buds to grow side by side upon the same stem, for one will weaken the other. Pinch off the smaller bud. Carnations love warmth; therefore give them a sunny aspect to blow in. The seedling plants may be treated like young pinks, but this difference must be observed—pinks love shade, and carnations love warmth. A bed of carnations is a beautiful object. The pots can always be sunk in a border or bed in fine weather. Carnations may be layered, or piped, or slipped for propagation.

Water your carnations in pots once a week with lime water, if they appear drooping, for this proceeds from a worm at the root; but the brine will destroy all insects quickly, when poured upon the compost heap.

In propagating double Wall-flowers, take slips of the young shoots of the head: this will perpetuate the double property and color of the flower, from which they were slipped. In saving seed for wall-flowers, choose the single flowers, which have five petals or flower leaves. Double flowers have no seed.

Water the slips, and keep them shady and moist: they will root by September.

Plant your Hollyhocks in September or October, where they are to remain. Hollyhocks are a noble flower, and they love a strong soil. Let a succession of these flower plants be attended to in the biennial seed-bed. Keep them some inches apart from each other in the seedling-bed, for they form large straggling roots. The hollyhock looks well in clumps of three, at a good distance apart, in large gardens or shrubberies, but they are somewhat too overgrown for smaller parterres.

Be particular in gathering your seeds on a fine, dry day, and put each sort in a separate brown paper bag till you require them. The very finest seedlings are, after all, those which spring near the mother plant from self-sown seed, therefore, when you weed or dig your flower borders, be careful not to disturb any seedlings which may have sprung up. They always make strong, fine blooming plants.

Take care of your double-flowering plants in winter. The double wall-flower is hardy enough to exist in the borders, but the other double biennials deserve to be sheltered, for double flowers are very handsome, and heavy rains, snow, or severe frost, injures them. Take cuttings every year from them.

The Night Stock is tolerably hardy if sheltered during the frost by ashes or litter. The sweetness after night-fall must recommend it to all the lovers of fragrant flowers.

PROPAGATING BIENNIALS.

Every young lady must become acquainted with the manner of operating upon plants, to preserve the finer sorts, which they may wish to perpetuate. Raising from seed is slow, but it produces infinite variety. You, however, rarely see the same flower produced twice from seed; therefore you must propagate the biennial and perennial flowers by layers, slips, pipings, and cuttings, if you wish to preserve any particular sorts.

To effect layers, prepare some rich, light earth, a parcel of small hooked sticks, or little pegs, and a sharp penknife.

Now clear the ground about the plant you are going to layer; stir the surface well with your trowel, and put a sufficient quantity of the prepared mould round the plant as will raise the surface to a convenient height for receiving the layer.

Cut off the top of each shoot with your knife, about two inches, and pull off the lower leaves; then fix upon a joint about the middle of the shoot, and, placing your knife under it, *slit* the shoot from that joint, rather more than half way up, towards the joint above it.

Now make an opening in the earth, and lay the stem, and slit or gashed shoot, into it, and peg it down; taking care to raise the head of the shoot as upright as you can, that it may grow shapely; then cover it with the new mould, and press the mould gently round it. Do this by each shoot till the plant is layered—that is, till every shoot is laid down. They must be watered often in dry weather, but moderately, not to disturb or wash away the soil round the layers. In six weeks' time, each gashed or slit shoot will have rooted, and become a distinct plant. They may be taken away from the old parent stem in September, and dug up with a ball of earth round each root, to be transplanted into the plots or borders where they are to remain.

Carnations, pinks, sweet-williams, double wall-flowers, &c., are the flowers most deserving of layers.

Piping, which belongs almost exclusively to carnations and pinks, is a most expeditious mode of raising young plants.

Take off the upper and young part of each shoot, close below a joint, with a sharp knife, and cut each off at the third joint, or little knob; then cut the top leaves down pretty short, and take off the lower and discolored ones. When you have piped in this way as many as you require, let them stand a week in a tumbler of water, which greatly facilitates their doing well. Indeed, I never failed in any pipings, slips, or cuttings, which I allowed to soak and swell in water previous to planting. When you plant the pipings, let the ground be nicely dug, and raked very fine; dibble no hole, but gently thrust each piping half way down into the soft earth, slightly pressing the earth round each, to fix it in the bed. Water them often if the weather is dry, but moderately, just to keep them moist; and shade them from the hot sun in the day. If pipings are covered with a hand-glass, they root earlier, by three weeks, than those which are exposed.

Laying, piping, and slipping, are done in June and July. The plants will be well rooted, and fit to plant out, in October.

The operation of slipping is easy. Tear the top shoots of the plant to be so propagated, gently from their sockets; hold the shoot between your finger and thumb, as near the socket as you can, and it will tear as easily and neatly as you carve the wing of poultry or game. Place the slips in water for a few days previous to planting them, like pipings. They will root in six weeks or two months, if kept shady and moist.

Cuttings must be made of shoots of the last year's growth of roses, honeysuckles, &c., and planted in February. Choose the strong shoots, and do not cut them less than six inches long. Cut them with your knife in a slanting direction. Plant them in a shady place, each cutting half way in the ground, which should be cleaned, and well dug and raked, to receive them. Cuttings made in February will root well by October.

Cuttings of flower stalks, such as scarlet lychnis, should be done in May, June, and July. Take cuttings from the youngest flower stems, and plant them carefully in nice mould, like pipings. These flower cuttings should be in lengths of four joints each. Covering them with a hand-glass raises them very quickly. They root in two months.

Where hand-glasses are not to form any part of a lady's arrangements, oil-papered frames are equally useful. I have seen very economical and useful frames made of bamboo, in the *form* of hand-glasses, covered neatly with glazed white cotton or linen, or horn paper, made by a lady with great celerity and ingenuity; and her cuttings and pipings succeeded under them admirably. Whatever shelters cuttings and pipings from the rays of the sun effects a material purpose. Linen is the best shelter in the world from heat, but oiled or horn paper resists rain better.

Dr. Priestley is of opinion that salt water is very efficacious for cuttings, if they are placed in it for a few days previous to planting. He remarks that it is a custom with the importers of exotic plants to dip cuttings in salt and water, otherwise they would perish on the passage.

CHAPTER V.

ANNUALS.

ANNUALS, as I have observed before, are flowers that rise, bloom, and die in the same year; and must therefore be raised from seed every year.

The first class of annuals, being very delicate, and requiring great care, with the constant assistance of glass frames, I shall not even name, since they do not enter into the nature of my work.

I proceed to the second class, which are hardier than the above, though they should be raised in a warm border, and be covered with a hand-glass, if you wish them to flower in good time.

The ten weeks' Stocks will grow, if sown in a warm border, towards the end of March, and should be afterwards transplanted; but if brought up in a hot-bed, they will flower a month or six weeks earlier.

The China-aster, Chrysanthemum, white and purple Sultan, African and French Marigolds, Persicarias, &c., will grow well in a warm border of natural earth, if sown in April; but they also flower a month earlier if they are assisted by a hot-bed or glass. These annuals must be all planted out when tolerably strong, into the spots where they are destined to remain in the borders, taking care to allow to each plant plenty of space, that they may not crowd each other. The China-aster branches into many stems and flowers, therefore they may be planted singly, or not less than six inches apart. The July flowers, or more commonly called gilliflowers, become expansive as they increase. They should not be crowded together; three in a group are quite sufficient, and they should be six inches apart. The same may be said of the stock varieties.

I have ever found the hardy annuals grow finest by allowing them to become self-sown. They flower some weeks earlier, and invariably produce larger and brighter flowers.

When gathering my flower seeds in August and September, I allow one half to remain sprinkled over the borders; and the young plants never fail appearing healthy and strong above ground in March and April, the months appropriated to sowing the seed. Thus, my Lavateras, Larkspurs, &c., are in beautiful blow, while the second crop, or seeds sown in spring, are but showing their green heads above the surface. I weed away the superfluous self-sown plants to my taste; but the birds take care that no one shall be encumbered with a superfluity. I have by this means a first and second crop of the same annuals, but the crop of self-sown are far superior. They are up before the heats come on, to dry the earth, and dwindle the flower.

Dig the ground well with your trowel, and rake it very fine, before you put in the seeds in spring. Annuals love a light, friable soil. All the hardy kinds may be sown in March, each sort in little separate patches, as follows:—

Draw a little earth off the top to one side, then sprinkle in the seed, not too plentifully, and cover it again with the drawn-off earth. Half an inch is sufficient depth for small seed. The larger kind, such as sweet-peas, lupins, &c., must be sown an inch in depth. When the plants have been up some time, thin them well. The more space you have, the finer the plants will rise.

The hardy annuals will not bear transplanting: they must be left to flourish where they are sown. The large kinds, such as the lavatera or mallow, should only be sown in groups of three plants together. The lupin tribe should not exceed five plants in a group. The Convolvulus, also, requires four or five plants only in a group. Water the patches in dry weather moderately, and be careful never to use pump water. If you have no soft water, a tub should be placed in the garden to receive rain water; and if, as in towns, pump water must be chiefly used, let it remain a day or two in the tub, to soften in the air and sunshine.

The first week in April is the safest period for sowing annuals, as the cutting winds have ceased by that time, and frost is not so much to be apprehended. The soft rains, also, fall in warm showers, to give life and germ to seeds and plants, and they appear in a shorter space of time.

Those ladies who live in the vicinity of nursery gardens have a great advantage over the more remote flower-fanciers. They can be supplied, at a trifling expense, with all the tender annuals from hot-beds, either in pots, or drawn ready for immediate transplanting.

If you do not raise your own seed, be careful how you purchase your stock, and of whom you receive it. Many seedsmen sell the refuse of many years' stock to their youthful customers, and produce great disappointment. There is one way of ascertaining the goodness of the seed, which will not deceive. Previous to sowing, plunge your lupin, sunflower, &c., seeds into a tumbler of water: the good seed will sink, while the light and useless part remains floating on the surface.

If you grow your own seed, exchange it every two years with your neighbors. Seeds love change of soil: they degenerate, if repeatedly grown and sown upon the same spot, particularly sweet-peas.

Sweet-peas should be put into the ground early in March, for they will bear the wind and weather. Make a circle round a pole, or some object to which they may cling as they rise; and put the peas an inch deep, having soaked them previously in water well saturated with arsenic, to guard them from the depredations of birds and mice. Add an outer circle of peas every month, so that a continual bloom may appear. The circle first sown will ripen and pod for seed in the center, while the outer vines will continue flowering till late in the autumn. When you have gathered a sufficient number of ripe pods, cut away all the pods which may afterwards form with your knife. This strengthens the vines, and throws all their vigor into repeated blooms.

Be very careful to throw away the arsenic water upon your heap of compost, and do not put that powerful poison into any thing which may be used afterwards in the house. Soak the peas in a flower-pot saucer which is never required for any other purpose, and keep it on a shelf in the tool-house, covered up. Three or four hours' soaking will be sufficient. If the wind and frosts be powerful and continued, shelter the peas through March, by covering them with straw or matting every evening.

I have got sweet-peas into very early blow by bringing them up in pots in-doors, and transplanting them carefully in April, without disturbing the roots. In doing this, push your finger gently through the orifice at the bottom of the flower-pot, and raise its contents "bodily." Then place the ball of earth and plants into a hole troweled out to receive it; cover it round gently, and, if the weather is dry, water it moderately.

Ten-weeks' Stock is a very pretty annual, and continues a long time in bloom. Mignionette is the sweetest of all perfumes, and should be sown in September for early blowing, and again in March for a later crop. It is always more perfumy and healthy, if dug into the ground in autumn to sow itself. Venus' Looking-glass is a very pretty, delicate flower. Indeed, every annual is lovely; and the different varieties give a gay and rich appearance to the flower garden during the three summer months.

The Clarkias are very pretty annuals, with a hundred other varieties lately introduced, and which are all specified in Mrs. Loudon's new work upon annuals. My plan is, to give a general idea of their treatment only, under the classification of hardy annuals, or those annuals which may be nurtured without a hot-bed.

Keep your annuals from looking wild and disorderly in a garden by allotting the smaller kinds their separate patches of ground; and trim the larger annuals from branching among other flowers. For instance, cut away the lower branches of the China-aster, the African marigold, &c., and train the plant erect and neatly to a slight rod or stick; cut away the flowers as they droop, reserving one or two of the finest blooms only for seed: and let each plant look clean and neat in its own order. By cutting away flowers as they droop, the plant retains vigor enough to continue throwing out fresh flowers for a long period.

SECOND, OR LESS TENDER CLASS OF ANNUALS.

- *African Marigold*, the orange
  - Yellow
  - Straw-colored
  - Double of each
  - Double-quilled
- *French Marigold*, the striped
  - The yellow
  - Sweet-scented
- *China-aster*, the double
  - Double purple
  - Double white
  - Double-striped
- *Marvel of Peru*, the red striped
  - Yellow-striped
  - Long-tubed
- *Chrysanthemum*, the double white
  - Double yellow
  - Double-quilled
- *Sweet Sultan*, the yellow
  - White
  - Red
- *Indian Pink*, double
  - Single
  - Large imperial
- *Alkekengi*
- *Palma Christi*, the common
  - Tall red-stalked
  - Smaller green-leaved
  - Smallest
- *Tobacco*, long-leaved Virginia
  - Broad-leaved
  - Branching perennial
- *Love Apple*, with red fruit
  - With yellow fruit
- *Gourds*, the round smooth orange
  - Rock, or warted
  - Pear-shaped yellow
  - Pear-shaped striped

  - Stone colored
- *Bottle Gourd*, some very large, from two or three to five or six feet long, and of various shapes
- *Momordica Balsamina*
- *Persicaria*
- *Indian Corn*, the tall Dwarf
- *Nolana prostrata*, blue
- *Convolvulus*, scarlet-flowered
- *Yellow Balsam*, or Touch-me-not
- *Capsicum*, long red-podded
  - Long yellow-podded
  - Red, short, thick, roundish podded
  - With heart-shaped pods
  - With cherry-shaped fruit, red
  - Cherry-shaped fruit, yellow
- *Basil*, the common, or sweet-scented
  - Bush basil
- *Zinnia*, red
  - Yellow
- *Amaranthus*
- *Tree Amaranthus*
  - Prince's feather amaranthus
  - Love-lies-bleeding amaranthus
- *Cannacorus*, yellow
  - Red
- *Chinese Hollyhock*, the variegated
- *Ten-week Stock Gilliflower*
  - The double red
  - Double white
  - Double purple
- *White Ten-week Stock*, with a wall-flower leaf
  - With double and single flowers
  - The double of this sort makes a pretty appearance

The following are hardy annuals, requiring no assistance of artificial heat, but should all be sown in the place where it is designed they shall flower:—

- *Adonis Flower*, or Flos Adonis, the red-flowering
  - The yellow
- *Candytuft*, the large
  - Purple
  - White
- *Larkspur*, the double rose
  - Double-branched
  - Large double blue
  - Double white
- *Lupins*, the rose
  - Large blue
  - Small blue
  - Yellow
  - White
  - Scarlet
  - Marbled
- *Sunflower*, the tall double
  - Double dwarf
- *Lavatera*, red
  - White
- *Poppy*, the double tall striped carnation
  - Dwarf-striped
  - Double corn poppy
  - Horned poppy
- *Convolvulus*, major
  - Minor
  - Striped
  - White
  - Scarlet
- *Ketmia* bladder
- *Starry Scabius*
- *Hawkweed*, the yellow
  - Purple, or red
  - Spanish
- *Carthamus tinctorius*, or saffron flower
- *Nasturtium*, the large
  - Small
- *Cerinthe major*, or great Honey-wort
- *Tangier Pea*
- *Sweet Pea*, the painted lady
  - The purple
  - White
  - Scarlet
- *Winged Pea*
- *Crowned Pea*
- *Nigella*, or devil in a bush, the long blue, or Spanish
  - The white
  - Oriental mallow, curled

  - Venetian mallow
- *Lobel's Catchfly*, white and red
- *Arbiscus*
- *Pimpernel*
- *Dwarf Lychnis*
- *Venus's Navel-wort*
- *Venus's Looking-glass*
- *Virginian Stock*
- *Strawberry Spinach*
- *Noli me tangere*, or Touch-me-not
- *Heart's Ease*
- *Snail Plant*
  - Large ditto
- *Caterpillar Plant*
- *Hedgehog Plant*
- *Antirrhinum*, snap-dragon, the annual
- *Nolana*, blue
- *Cyanus*, or corn-bottle, the red
  - White
  - Blue
- *Roman Nettle*
- *Belvidere*, or summer cypress
- *Garden*, or *common*, *Marigold*, the common single
  - Double orange
  - Double lemon-colored
  - Double lemon-colored ranunculus marigold
- *Annual Cape Marigold*, with a violet and white flower
- *Mignionette*, or reseda, the sweet-scented
  - The upright
- *Xeranthemum*, or eternal flower, red and white
- *Purple Clary*
- *Purple Jacobœa*
- *Dracocephalum*, the purple
  - Blue
- *Capnoides*, or bastard fumitory
- *Ten-week Stock Gilliflowers*, in variety
- *Persicaria*
- *Tobacco Plant*
  - Long-leaved,
  - Round-leaved
- *Indian Corn*
- *Amethystea*
- *Globe Thistle*
- *Clarkias*

CHAPTER VI.

ROSES AND JASMINES.

THESE most delicious, most elegant flowers—in themselves a garden—are worthy of a chapter devoted exclusively to their culture. What cottage exists without its roses twined around the doorway, or blooming up its pathway? What is sentiment without its roses? What other flower illustrates the beauty and excellence of a loved one?—

> "Oh! my love is like the red, red rose,
> That sweetly blows in June."

Every gentle feeling, every exquisite thought, every delicate allusion, is embodied in the rose. It is absurd to say the rose by any other name "would smell as sweet." It is not so. Poetry, painting, and music, have deified the rose. Call it "nettle," and we should cast it from our hands in disgust.

There are innumerable varieties of roses, from the cottage rose to the fairy rose, whose buds are scarcely so large as the bells of the lily of the valley. Mrs. Gore mentions some hundreds of sorts, but such a catalogue is too mighty to insert in my little work. I will name only the well-known hardy kinds, and refer my reader to Mrs. Gore herself for the complete collection. Seed yields such inexhaustible varieties, that a new list will be required every ten years.

The *Damask rose* is very useful from its properties, as well as its beauty and hardihood. Rose-water is distilled from this bright, thickly-blowing flower

The *Cabbage roses* is the most beautiful, as well as the most fragrant of roses. All others are varieties of roses, but this grand flower is the "rose itself."

It throws out suckers plentifully for propagating its kind; and every two or three years, the root of each bush will part into separate plants. Cut the roots slanting with a sharp knife as you divide them. A very small bit of root is sufficient for a rose-bush, as they are hardy in their nature. Do not move roses oftener than you can help: they delight in being stationary for years.

In pruning roses of every description, which should be effected in January, shorten all the shoots to nine inches only, and cut away all the old wood, which becomes useless after two or three years' growth. This treatment insures fine flowers.

Roses love a good soil, as, indeed, what flower does not? Fresh mould applied to them every two or three years, or manure dug round them annually, preserves them in constant vigor and beauty.

Shoots of rose-bushes laid down and pegged like layers, only without gashing, when the flowers are in bloom, will root and become plants in the autumn. Pinch off their buds, that they may throw their strength into their roots.

Roses are often observed to change their color, which effect proceeds chiefly from bad soil. When this occurs, manure the root of the bush or plant. A clay soil, well dressed with ashes, is the best of all soils for the hardy roses.

Moss roses love a cool soil and a cool aspect. They soon fade in a hot sun.

A pyramid of climbing roses is a beautiful object in a garden. Iron or wooden stakes, twelve feet in height, gradually approaching each other, till they meet at the top, with climbing roses trained up their sides, is a pleasing and easily constructed ornament. Fancy and taste may range at will in inventing forms to ornament the parterre with roses. Beds of roses, raised pyramidally, have a splendid effect. When the flowers die away in the autumn, the mass may be clipped again into form, with the garden shears, as you would clip a laurel hedge.

Standard roses, which are so much in fashion at this time, and which always remind one of a housemaid's long broom for sweeping cobwebs, are beyond a lady's own management, as budding is a troublesome business, and very frequently fails. I will not, therefore, touch upon that subject.

The *double yellow rose* is very elegant. It requires a western aspect, and even prefers north and east, but a warm aspect injures its beauty. It loves a good substantial soil, and will not bear much cutting or removing. Let it alone in its glory, only pruning away the old scraggy wood occasionally, to strengthen the plant.

The *monthly rose* is also a lover of the north and east. It blooms through the autumn and winter, has an evergreen leaf, and loves a strong soil. It must be propagated by cuttings, and parting the roots, as it never throws up suckers. Prune away the old wood, and make cuttings in June, July, and August, of the branches you clear away. Plant the cuttings in loose, moist earth, and do not let them bud till the following year. Let the cuttings be sunk two joints in the earth, leaving only one exposed. The monthly rose climbs, or creeps.

The *Austrian briar,* or *rose*, will not flower if exposed to the south. It bears a rich mass of flowers, yellow outside, and deep red within. Give it an eastern or western aspect.

The *perpetual,* or "four-season" rose, requires a rich soil. The flower buds appearing in June or July should be pinched off, and in winter the plant may be pruned as closely as its hardier companions. Place the four-season rose in a sheltered situation from winds.

Among the hardy climbing roses, the *Ayrshire rose* is the most useful. Its foliage is rich, and it covers fences, walls, &c., with astonishing rapidity. It flowers in July. Place it in a warm situation, and it will extend thirty feet in one season.

Lady Banks's yellow rose is a pretty climber, and flowers early in all situations. So does the *Rosa sempervirens.*

Climbing roses will grow luxuriantly under the shade of trees, and form a mass of fragrant underwood in shrubberies. They grow with surprising vigor if allowed to remain prostrate. Plant these thinly, and lay in the most vigorous shoots, by pegging them down into the ground. This process increases the plants rapidly, and gives the gayest possible effect.

The *Rosa hybrida multiflora* is a hardy and rapidly growing rose. It flowers also from June to September. So does the red and crimson Boursault, and the *Rosa Russeliana.*

Roses are subject to the green fly, which disfigures their beauty, particularly the white roses. An excellent remedy for this annoyance is effected by moistening the plant, and then dusting it over with equal portions of sulphur and tobacco dust.

The following list of roses will not prove beyond a lady's management, being hardy, and requiring only pruning every January, and giving them a good soil. Prune the white rose-trees very sparingly, as they do not love the knife:—

Roses, early cinnamon
  Double yellow
  Single yellow
  Red monthly
  White monthly
  Double white
  Moss Provence
  Common Provence
  Double velvet
Single Ditto
Dutch hundred-leaved
Blush ditto
Blush Belgic
Red ditto
Marbled
Large royal
York and Lancaster
Red damask

Blush ditto
Austrian, with flowers having one side red and the other yellow
White damask
Austrian yellow
Double musk
Royal virgin
Rosa mundi, *i. e.*, rose of the world, or striped red rose
Frankfort
Cluster blush
Maiden blush
Virgin, or thornless
Common red
Burnet leaved
Scotch, the dwarf
Striped Scotch
Apple-bearing
Single American
Rose of Meux
Pennsylvanian
Red cluster
Burgundy rose
Perpetual, or four-season

HARDY CLIMBING ROSES.

The Ayrshire rose
  Double ditto
Rose hybrida multiflora
Rose Clair
Rosa Russeliana
Reversa elegans
Rosa sempervirens, three sorts
Rose ruga
Red Boursault
Crimson ditto
Lady Banks' yellow rose

JASMINES.

Jasmines grow in very irregular forms. Perhaps their luxuriant wild appearance constitutes their chief grace. The jasmine is a beautiful screen in summer, wreathing its festoons through trellis-work; and it appears to me that Nature presents not, in our colder climes, a more fragrant and beautiful bouquet than a mixture of roses and jasmines.

The common jasmine is hardy, and loves a good soil, by which term I mean kitchen garden soil. Trench round the stem occasionally to lighten the earth, and it will grow very freely. Put litter round the jasmine in severe frost; and if a very rigorous season destroy the branches, the root will be saved, and its shoots in the spring will soon replace the loss. If they shoot out with displeasing irregularity and confusion, take off the least healthy looking branches, and cut away those which grow *rumpled*, for they only consume the juices of the plant to no purpose. The common jasmine is propagated by layers and slips.

The *Arabian jasmine* is very fragrant, but it does not endure cold, or much heat, therefore an eastern aspect suits it best. If the Arabian jasmine is grown in a large pot or box, it could be placed under cover during frost in the winter months; but do not place it in a green-house, which would be in the other extreme again.

The *yellow jasmine* may be treated like the common jasmine. It is not very fragrant, but it forms an elegant variety.

I have seen very fanciful and beautiful devices invented to display the beauty of the jasmine. Their shoots grow so rapidly and luxuriantly, that if the plant is allowed to luxuriate, it will soon cover any frame-work with its drooping beauty. The jasmine loves to hang downwards; and I have admired inventive little arbors, where the plant has been trained up behind them, and the branches allowed to fall over their front in the richest profusion, curtained back like the entrance of a tent. The effect, during their time of flowering, was remarkably elegant.

When you prune the jasmine, cut the branches to an eye or bud, just by the place from which they sprout, and that in such a manner, that the head when trimmed, should resemble the head of a willow. This method makes them throw out abundance of branches and fine flowers.

Give fresh soil to the jasmine every two years, or they will gradually become weakened in their blooms. The secret of having fine flowers is in keeping up the soil to a regular degree of strength, as the human frame languishes under change of diet, and becomes weakened for want of food. Thus it is with animate and inanimate nature.

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CHAPTER VII.

ORNAMENTAL SHRUBS AND EVERGREENS.

I SHALL speak now of the ornamental shrubs which decorate a flower garden, and which a lady may *superintend* herself, if her own physical powers are not equal to the fatigue of planting. A laborer, or a stout active girl, may act under her orders, and do all that is necessary to be done, in removing or planting flowering shrubs and evergreens.

In planting flowering shrubs, be very particular to plant them at such distances that each plant may have plenty of room to grow, and strike out their roots and branches freely. If shrubs are crowded together, they become stunted in growth, and lanky in form.

If you are forming a clump, or even a plantation, let each shrub be planted six feet apart from its neighbor: but if you wish to plant roses, syringas, honeysuckles, lilacs, &c., in your flower borders, they should be from twelve to fifteen feet distant from each other, so as not to interfere with the flowers growing below them.

Do not plant tall shrubs promiscuously among low-growing ones. Let the taller shrubs form the back-grounds, that each shrub may be distinctly seen. The shrubs should be trained up with single stems, and they should be pruned every year, taking up the suckers, and removing disorderly branches.

By allowing each shrub plenty of room, it will form a handsome head, and throw out vigorous shoots. You will also have space to dig between the shrubs, and the sun and air can benefit them.

Some of the more beautiful evergreens look extremely well dotted about the grounds singly or in clumps, but be very particular in planting your shrubs.

For instance, when you wish to transplant or plant a shrub, dig a circular hole sufficiently large to receive the roots of the plant, which must be laid neatly down, while some person holds the shrub in its proper position, straight and upright. Cut away any dead or damaged roots; then break the earth well with your spade, and throw it into the hole, shaking the plant gently, just to let the earth fall close in among the roots. When it is well filled up, tread the earth gently round the shrub to fix it, but do not stamp it, as I have seen people do.

But if you can take up shrubs with a ball of earth round their roots, they do not feel the operation, and their leaves do not droop. Water each shrub after planting: give each of them a good soaking, and let each plant have a stake to support it during the winter.

October is the autumn month for transplanting shrubs, and February and March are the spring months. I always prefer the autumn transplanting, as the rains and showers are so fructifying. March is the last month for transplanting evergreens.

Laurustinus, Phillyreas, and Laurel, are excellent shrubs to plant near buildings, or to hide a wall. They are evergreen summer and winter, very hardy, and quick growing.

The Pyracantha is an elegant shrub, with its clusters of red berries; and it looks gay during the autumn and winter.

The Arbutus, or strawberry tree, is loaded with its strawberries in August, September and October. This is a beautiful shrub, placed singly on a lawn, kept to one single clean stem, and a fine branching head.

Portugal laurels are beautiful: their deep green leaves, and scented feathery flowers, make them an important shrub in all gardens.

It has been ascertained by the late severe winter, that evergreens are extremely hardy, and will bear any severity of frost. All those evergreens considered most tender, such as Portugal laurels, rhododendrons, &c., were observed to brave the frost unhurt, which were placed in high unsheltered places, or facing the east and north. It was observed, also, that those evergreens were destroyed whose aspect was south and west, and which lay in warm and sheltered situations. The cause was this. The shrubs did not suffer which were not subject to *alternations* of heat and cold; while those which lay in warm situations, being thawed by the sun's rays during the day, could not endure the sudden chill of returning frost at night.

Plant your evergreens, therefore, fearlessly in exposed situations; and care only, in severe winters, for those which are likely to be thawed and frozen again twice in twenty-four hours.

Rhododendrons are very beautiful shrubs, and grow into trees, if the soil agrees with them. They love a bog soil.

The Camelia japonica is considered a green-house plant, but it becomes hardy, like the laurel, if care is taken to shelter it for a few winters, when it gradually adapts itself to the climate. This is troublesome, perhaps, as most things are, to indolent people; but the trouble is well repaid by the beautiful flowers of the japonicas, its dark leaves, and delicate scent.

The gum Cistus is a handsome evergreen, and looks well anywhere and everywhere. Some straw litter spread round their roots in winter is a great protection.

All evergreens of a hard-wooded nature are propagated rapidly by layers in June or July. This is the method :—Dig round the tree or shrub, and bend down the pliable branches; lay them into the earth, and secure them there with hooked or forked sticks. Lay down all the young shoots on each branch, and cover them with earth about five inches deep, leaving the tops out about two, three, or four inches above ground, according to their different lengths. If these branches are laid in June or July, they will root by Michaelmas; but if they are laid in October, they will be a twelvemonth rooting.

The layers of Alaternuses and Phillyreas will sometimes be two years rooting, if done so late as October; therefore lay down your shoots, if possible, in June. Let the shoots which are layered be those of the last summer's growth.

You may propagate shrubs also from cuttings in February and October. Let strong shoots be chosen, of last summer's growth: choose them from nine to fifteen inches long, and, if you can, take about two inches of old wood with the shoots at their base. Trim off the lower leaves, place the cuttings half way in the ground, and plant them in a shady border to root. Do this in February, in *preference* to October, as everything roots earlier from spring operations. You may also plant cuttings in June, but keep them moist and shady.

October is a good month for taking up suckers of lilacs, roses, &c., and for all sorts of transplanting in its varieties. It is also the month to transplant the layers of such shrubs as were laid in the previous October.

I subjoin a list of hardy deciduous shrubs and evergreens, not too tall to admit into a moderately sized flower garden:—

DECIDUOUS SHRUBS OF LESSER GROWTH.

Arbutus, Strawberry tree
  Common
  Double-flowering
  Red-flowering
  Eastern, or Andrachne

Almond, common
  White-flowering
  Early dwarf, single flower
  Double dwarf
Althæa frutex, striped

Red
White
Blue
Purple
Pheasant's eye
Andromeda, striped
Evergreen
Azalea, with red flowers
White
Berberry, common, red fruit
Stoneless, red fruit
White fruit
Bladder-nut, three-leaved
Five-leaved
Broom, the Spanish
Double-flowering
Yellow Portugal
White Portugal
Lucca
Bramble, double-flowering
American upright
White-fruited
Dwarf
Thornless
Chionanthus, Fringe, or Snowdrop tree
Candleberry Myrtle, broad-leaved
Long-leaved
Fern-leaved
Oak-leaved
Cherry, double-blossomed
Cornelian
Dwarf Canada
Currant, with gold and silver-blotched leaves
With gooseberry leaves
Pennsylvanian
Dogwood, the common
Virginia
Great-flowering
Newfoundland
Empetrum, black-berried heath
Guelder Rose, common
Double, or snowball
Carolina
Gold-blotched leaf
Currant-leaved
Hydrangea, white-flowering
Honeysuckle, early red Italian
Early white Dutch
Late Dutch
Late red
Long-blowing
Large scarlet trumpet
Small trumpet
Oak-leaved
Early white Italian
Early red Italian
Ivy, deciduous, or Virginian creeper
Jasmine, the common white
Common yellow Italian
Gold-striped leaved
Silver-striped leaved
Lilac, blue
White
Purple, or Scotch
Persian, with cut leaves
Persian, white-flowered
Persian, blue-flowered
Lonicera, upright Honeysuckle
Red-berried
Blue-berried
Virginian
Tartarian
Mezereon, white
Early red
Late red
Purple
Mespilus, spring-flowering
Lady Hardwick's shrub
Peach, double-flowering
Privet, common
Silver-striped
Yellow-blotched leaves
Ptelea, or American Shrub Trefoil
Pomegranate, single-flowering
Double
Robinia, or false Acacia
Common
Yellow-flowered
Scarlet-flowered, or rose acacia
Caragana
Rhamnus, or Buckthorn
Common
Sea buckthorn
Yellow-berried
Creeping evergreen
Raspberry, double-flowering
Virginian sweet-flowering
Rose, in every variety
Spiræa frutex, common red
Scarlet
White

- *Sumach*, scarlet
  - Large downy
  - White
  - Virginia
  - Elm-leaved
  - Myrtle-leaved
  - Carolina
- *Syringa*, common
  - Dwarf double-flowerin
- *Scorpion Senna*
- *Smilax*, broad-leaved
  - Blotched-leaved
- *Tulip Tree*
- *Tamarisk*, the French
  - German
- *Viburnum*, or Wayfarer
  - Common
  - Stripe-leaved
  - American broad-leaved
  - Maple-leaved

EVERGREENS.

- *Alaternus*, common
  - Blotched-leaved
  - Jagged-leaved, plain
  - Ditto, striped
  - Silver-striped
  - Gold-striped
- *Cistus*, or Rock Rose
  - Gum Cistus, with spotted flowers
  - With plain white flowers
  - Purple sage-leaved
  - Male Portugal
  - Bay-leaved gum
  - With hairy willow leaves
  - Black poplar-leaved
  - Waved-leaved
  - Purple, or true Gum Cistus of Crete, with other varieties
- *Cytisus*, Neapolitan
  - Canary
  - Siberian and Tartarian
- *Laurustinus*, common
  - Broad, or shining-leaved
  - Rough-leaved
  - Oval-leaved
- *Bay*, broad-leaved
  - Narrow-leaved
- *Phillyrea*, the true
  - Broad-leaved
  - Privet-leaved
  - Prickly-leaved
  - Olive-leaved
  - Gold-edged
  - Silver-edged
  - Rosemary edged
- *Juniper*, common
  - Swedish
  - Sclavonian
  - Canada
- *Jasmine*, evergreen
- *Pyracantha*
- *Ivy*, common
  - Striped-leaved
  - Virginian
  - Irish, or quick-growing
- *Honeysuckle*, evergreen
- *Rose*, the evergreen
- *Rhododendron*, dwarf Rose Bay
- *Kalmia*, olive-leaved
  - Broad-leaved
  - Thyme-leaved
- *Coronilla*, narrow-leaved
  - Broad-leaved
- *Magnolia*, laurel-leaved
  - Lesser bay-leaved
- *Arbor Vitæ*, common
  - China
  - American
- *Cypress*, common upright
  - Male spreading
- *Bignonia*, the evergreen
- *Widow Wail*
- *Locust of Montpelier*
- *Medicago*, Moon Trefoil
- *Stonecrop Shrub*
- *Ragwort*, the sea
- *Holly*, the common
  - Carolina broad-leaved
  - Yellow-berried
  - Many varieties
- *Laurels*, common
  - Portugal
  - Alexandrian
- *Oak*, Ilex, or evergreen
  - Kermes, or scarlet-bearing

  Gramuntian, holly-leaved
  Carolina live
Germander, shrubby, of Crete
Euonymus, evergreen Virginia
Virginia Groundsel Tree
Wormwood, lavender-leaved
Spurge, or wood laurel
Knecholm, or Butcher's Broom
Horse-tail, shrubby

In pruning shrubs, be careful to cut out the long rambling shoots of the last summer's growth, which disfigures their appearance. Cut away, also, branches of shrubs which interlace each other, that every shrub may stand clear and well-defined. Take away their suckers, and let each shrub be kept to a single stem, as I have before observed.

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CHAPTER VIII.

ON HOUSE AND WINDOW GARDENING.

(BY MR. CHARLES MACKINTOSH.)

THE culture of flowering and sweet-scented plants, as ornaments in human dwellings, has been practiced from such remote antiquity that no one can name the date of its origin. House plants are also a kind of ornaments which all the labors of the most refined art can never exceed or even reach; and hence in the most refined and luxurious states of society, flowers maintain a high place among the leading ornaments; and the assembly-rooms of beauty and fashion, and the banqueting-halls of the noble and the great, would look tame and barren without those most beautiful and most appropriate decorums.

Farther, it is one of the great merits of these lovely productions of nature, that they are for the humble as well as for the high. The humblest window in the most obscure and crowded court of a city may have its flower-pot; and they who are cut off by occupation or other circumstances from the free range of growing nature, may still command a little vegetable kingdom of their own in a few well-selected and carefully-attended flowers.

A species of ornament, which is in its own nature so pleasing and so innocent, which requires far less labor and expense than many other ornaments of very inferior value, and which adapts itself to every imaginable class of society, is surely worthy of the study, the encouragement, and the care of all who seek happiness to themselves, or wish to promote the happiness of others.

That there is no want of love for such plants is evident from the places in which they appear; but the kind and state of the plants very generally show that there is a great want of knowledge, both in their selection and their management. In order to contribute a little to the supplying of this defect, we propose to offer a very brief compendium of what the French and Germans call "Window Gardening;" and in order to render what we state as clear as possible, we shall divide it into several heads, or points.

PLANTS PROPER FOR WINDOW CULTURE.

As the situation of these plants is different from what they occupy in their natural state, it becomes necessary to select such as are capable of accommodating themselves to circumstances; and as the unfavorable circumstances of house plants are chiefly want of free and pure air, and of light, and in those species which are accustomed to long seasons of repose in the winter, to uniform temperature, these circumstances must be kept in mind in the selection. Rooms, especially in crowded cities, are the most unnatural, and, on that account, the very worst situations in which plants can be placed; and therefore, if healthy plants and an abundance of bloom are sought for, variety must be sacrificed.

Plants which will continue healthy for a long time in the confined air of rooms, are generally those which have a peculiar surface, or texture in the foliage: such are many of the *Aloes*, *Cactuses*, *Mesembryanthemums*, among what are called succulent plants; and, in a higher temperature, some of the curious *Epiphytæ*, or the natural order *Orchideæ*. We recollect once seeing a very interesting collection of more than two hundred species, growing in a high state of perfection, in the house of an amateur of succulent plants, living in the Grand Sablon at Brussels. The room containing them was fitted up much in the same way as an ordinary library, with abundance of light shelves round the walls, and a large table in the middle of the room, on which were placed the pots containing the plants. At night, the room was lighted up by an elegant glass lamp, and it was heated by one of those ornamental stoves which are so common on the Continent. Altogether, it had a very handsome appearance.

The Chinese are very attentive to the house culture of many of the orchideous epiphytæ, and thereby greatly increase the beauty and the fragrance of their apartments; they have them in ornamental vases and baskets, and even suspended in the air, where they last for many years and flower beautifully. Some of them continue in flower for many months, and diffuse the most delightful fragrance during the night.*

The reason why the succulent and epiphytous plants answer so well for house culture is, that their winter is one of drought and not of cold, and that the latter especially have little, and some of them no mould at the roots in their natural situations. But there has been hitherto a prejudice against, or at all events an ignorance of, and want of attention to, the culture of succulent plants in this country. This is unwise; for many of them are exceedingly beautiful, highly fragrant, and better adapted for house culture than any plants whatever. They are singularly curious and varied in their structures; and, generally speaking, they require less light, air, and moisture, than other plants.

Next to them, in point of eligibility for house culture, may be reckoned such plants as have coriaceous leaves, that is, have their leaves firm, and with a smooth and compact epidermis,—such as oranges, pittosporums, myrtles, and others of similar texture; these are found to have organs much better adapted to confined air than plants which have the leaves small or of delicate texture. Some tribes, as the heaths, the *Epacrideæ,* and the whole race of pinnate-leaved and papilionaceous flowered plants, are wholly unfit for house culture.

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* *Renanthera coccinea* is one of the finest of these, and was first flowered in this country by the author of this paper.

TREATMENT OF HOUSE PLANTS.

Water, heat, air, and light, are the four essential stimulants to plants; water, heat, and air, to promote growth; and light to render that growth perfect.

Water, heat, and air, man can command at his pleasure by artificial means; but over light, as an element of the perfect growth of plants, we have less control. To be beneficial to plants, light must come directly from the sun; and therefore the plants should be so placed, as that it may act upon them with as little as possible of that refraction and decomposition which it suffers when it passes obliquely through glass, or any other medium except the air. Plants grown in the open air, and with such free exposure to the light as their habits require, not only develop all their parts in their proper form, but their leaves, flowers, and fruits, have their natural colors, odors, and flavors. Plants excluded from light have not their natural color, odor, nor flavor, they make little or no charcoal in the woody part, the leaves are not green, and if they do flower and fruit, which is rarely the case, the flowers are pale and scentless, and the fruit is insipid. This has been proved by many experiments, of which the blanching of celery and endive by earthing up, and that of a cabbage by the natural process of hearting, are familiar instances. A geranium placed in a dark room becomes first pale, then spotted, and ultimately white; and if brought to the light it again acquires its color.

If plants kept in the dark are exposed to the action of hydrogen gas, they retain their green color, though how this gas acts has not been ascertained. Some flowers, too, such as the crocus and tulip, are colored though grown in the dark.

Light seems to be fully as essential to plants as air or heat, and while it acts beneficially on the upper surfaces of the leaves, it appears to be injurious to the under surfaces, at least of some plants; for in whatever way a plant is placed, it contrives to turn the upper surfaces of its leaves to the light. Professor Lindley is, we believe, making some experiments on this subject.

Plants in rooms turn not only their leaves, but their branches to the window at which the light enters, and a plant may, by turning it at intervals, be made to bend successively to all sides; but such bendings weaken the plant, and thus it is an excessive or unnatural action. This turning of the plant to the light is always of course in proportion to the brightness of that light as compared with the other sides of the plant. Flowers, too, open their petals to the light, and close them in the dark, or in some cases, as in that of the crocus, when a cloud passes over the sun. The same flower, and also some others, will open their petals to the light of a lamp or candle, and close them again when that is withdrawn.

It follows as a necessary consequence, that in rooms, plants should be placed as near the window as possible, that the windows should have a south exposure, and that they should be as seldom as possible shaded with blinds or otherwise. If placed at a distance from the windows, plants should be frequently changed, and to place them permanently on tables or man el-shelves is bad management.

Air is as necessary to the health of plants as light; but air can find its way where light cannot, and therefore it requires less care from the cultivator. If the air is too close, opening the door and windows produces a change, the warm air escaping at top, and cold air coming in below; but on opening the windows of a warm room in cold weather, care must be taken not to chill the plants by leaving them in the cold current.

The heat of ordinary dwelling-houses is quite enough for such plants as we would recommend for general culture in rooms, only, in very cold weather, the plants should be removed a little further from the windows. The blinds and shutters are usually a sufficient protection during the night; and we may remark that plants in rooms are more frequently killed by too much heat than by too much cold.

Spring and autumn are the times of the year at which window plants require the greatest attention. It is usual to have the plants outside the windows even during the night in the summer season, and kept in the house both night and day in the winter season. In the intermediate seasons of spring and autumn the plants are frequently placed in their summer situation during the day, and it is desirable that then they should be placed in their winter situation during the night. Our climate is so variable at those seasons, that we not only have summer during the day, and winter during the night, but whole days of summer and winter alternating with each other. Sometimes we have warmer days in April than in May or June, and occasionally we have more severe frosts in the beginning of September, than any which occur again till November is nearly over. Now it is not the absolute heat or cold, but the rapidity of the transition from one to the other which is injurious to plants, and therefore it is absolutely necessary for all such as would have their house plants in the perfection of beauty, to attend to those circumstances. This is more especially necessary in towns, where the people are much less interested in the changes of the weather, and therefore much less observant of them than they are in the country; and we have no doubt that more plants are destroyed from want of attention to those variable periods of the year than from any other cause. It is a safe rule to trust no plant less hardy than a common *Geranium* outside the window all night, earlier than about the twentieth of June, or later than the first of September. No doubt there are many nights before the first of these times, and after the latter, during which the plants might remain in the open air without injury. There is, however, no knowing what a night may bring forth at those inconstant seasons, and therefore the safe plan is not to leave the plants to chance.

When, as often happens, plants get slightly injured by rost, cold water should be sprinkled on them before the sun reaches them, and this sprinkling ought to be continued as long as any appearance of frost remains on the foliage.

Water is often very injudiciously applied to plants in rooms, and the evil arises from falling into the opposite extremes of too much and too little. Fear of spoiling the carpet, forgetfulness, and sometimes a dread of injuring the plant, are the chief causes of an under supply of water. On the other hand, many have a notion that such plants should be watered every day, or at stated periods, without inquiring whether it be necessary or not. Saucers or pans are often placed under flower-pots to prevent the water, which escapes, from soiling the apartment, but in these cases the saucers should be partly filled with gravel, to prevent the roots from being soaked with water, or the water which lodges in the saucer should be removed.

Fanciful and elegant baskets of wire or wicker-work, and plant-tables are, perhaps, preferable to common stages. The baskets should have a pan, of zinc, copper, or other metal, and over this a bottom pierced with holes, or a grating of wire, on which the pots are to be placed. The pan is generally about an inch deep, and has a plug or other contrivance by which the surplus water may be drawn. Plant-tables can be constructed in the same manner, and admit of an endless variety of forms, according to the taste of the owner. In either of these the pots may be wholly concealed by green moss, or cut paper, so that nothing but the plants themselves may appear.

Water is as essential to the whole plant as it is to the roots, because they are liable to collect dirt, and thereby to be injured; they should, therefore, be frequently washed over with a syringe having a rose to it, and in order to perform this operation properly, the plants must generally be removed to some other apartment where they should remain till they are dry. In winter this operation must be performed in mild weather only; it should be done in an apartment not colder than that in which the plants usually stand, and the water should be about milk warm. When the plants are in baskets or on tables, they can be removed and washed without deranging their order. Plants which have large and leathery leaves, such as oranges, pittosporums, camellias, and myrtles, may be washed with a sponge, or if very foul they may be washed with soap, and the soap carefully removed by pure water. Loose dust may be removed by a pair of bellows. Attention to cleanliness greatly increases the vigor of the plant.

House plants are greatly benefited by being placed out of doors in the summer months, especially during gentle showers; and such as have no other convenience may advantageously place them outside the windows. They may also be syringed and washed in this position, and if the owner is not in possession of one, a common watering-pot, held high, so that the water may fall on the plant with considerable force, is a tolerable substitute.

Plants respire by their leaves, as animals do by their breathing apparatus, and it is on this account that keeping the leaves clean is so very essential to the health of plants. Indeed, the dust which collects on them, and interrupts their respiration, is one of the greatest evils which can befall plants, especially in rooms and on balconies in towns. The respiring pores are generally large in proportion as the leaves are so; and this is one of the reasons why delicate-leaved plants are not so well adapted for house culture as those which have the leaves larger and firmer.

Light has also a considerable effect in promoting the healthy action of leaves, and many plants fold up their leaves in the dark, or even when the sky is lowering. This, though it has no resemblance to sleep in animals, has been called the sleep of plants, and the curious reader may find an interesting notice of it in the "Amœnitates Academicæ" of Linnæus.

THE SUPPLY OF HOUSE PLANTS.

There are many ways of doing this; but to those who have the opportunity, and choose to be at the expense, there is, perhaps, none better than that of contracting for the year with some skilfull and respectable nurseryman; in this case the plants will be attended by the contractor, and kept in the best condition. Much pleasure is, however, sacrificed by those who adopt this mode, inasmuch as the chief enjoyment of plants arises from the feeling that they are the nurslings of our own care; and it is astonishing how strongly the judicious treatment of plants leads to judicious management in all other matters.

Plants, except such as are novelties and sought only by the curious, may always be had at moderate prices from respectable growers. Covent Garden furnishes an abundant supply for London, and those who are not so particular may have them of the hawkers. In dealing with these people, some care is however necessary; very many of the plants which they offer for sale are thrown away or stolen, and in both cases they are taken up without any regard to the preservation of the roots, and thus there is a considerable chance against their success. Those injured plants are made to look healthy for a little time by means of an over supply of water, but they soon languish in the possession of the purchasers.

Another very hazardous mode of purchasing plants is at those sales which are very frequently got up in the spring and autumn. At these, purchasers have no security that the plant is healthy, or that it is what it professes to be, and thus they often pay a higher price for a worthless article in a diseased state, than a regular nurseryman would charge them for a good plant in the finest condition. Such a nurseryman has always character at stake, but the other parties, generally speaking, have none.

MANAGEMENT OF BULBS IN GLASSES.

This is a favorite mode of house culture, and the bulbs best adapted for it are hyacinths, polyanthus-narcissus, Van Thol, and other tulips, crocus, Persian iris, narcissus, colchicum, Guernsey lily, jonquil, and others.

Spring-flowering bulbs are usually purchased in September, and the autumnal ones in July and August, and the largest and best-formed bulbs should be chosen; an abundant supply may be obtained at little cost at the seed-shops and nurseries. To be blown in winter or spring, the bulbs are placed in water in October, and so on in succession till February or March; and for autumn and early winter, they are placed in the water in August and September. Dark-colored glasses are the best, as they prevent the light from decomposing the roots of the plants. Rain water is preferable to any other, and it should be changed frequently, not less than once every third or fourth day, to prevent its getting putrid; and in performing this operation care must be taken both in withdrawing and in replacing the roots. This is necessary only till the flowers have expanded; for after this the plants may be left undisturbed until the flowers have decayed.

The water which is supplied must not be colder than that which is withdrawn, or than the general temperature of the apartment. Much heat is not necessary for such plants, because they flower better the more slowly their vegetation proceeds. Chimney-pieces and other warm situations are not nearly so well adapted for those bulbs as stages near the window, or the window-sill itself.

A better mode of growing those bulbs than the common mode in glasses, would be in a table with a deep pan, and a wire grating on the top. This might be placed about nine inches from the bottom of the pan, and the roots arranged on it, the taller ones in the center, and those of more lowly growth towards the sides. The water in the pan might be drawn off by a plug, and fresh water supplied, without in the least disturbing the plants.

Bulbs may also be grown in fine white sand, kept constantly moistened, and in this way very beautiful blooms may be obtained.

NOSEGAYS AND CUT FLOWERS.

Though these are very acceptable to most persons, there are few who rightly understand the art of keeping them long in a fresh state, or of reviving them when they have faded. It is true, that when a flower or branch is cut off from its parent plant, its support is thereby destroyed; but still some flowers may be kept in great beauty for a much longer period than others, and many for a far longer time than is generally done, or even supposed possible.

For this purpose, flowers should be gathered early in the morning, but not till the dew be nearly dried off them. They should be placed in a flat basket, or on a tray, so as not to press upon and crush each other; and they should be neatly cut, and not mangled or bruised. When thus gathered, they should be covered with a sheet of paper, and immediately conveyed to the apartment where they are to be used, if that apartment be near at hand. But if they are to be sent to any distance, they should be placed in tin cases, such as botanists use when collecting specimens. We have sent flowers, in such cases, for several hundred miles, and found most of them in good condition at the end of a journey of three or four days' continuance. In this way the Dutch florists send specimens of their finest flowers not only to England, but to more distant parts of continental Europe. Our own florists send to the metropolis, for competition at exhibitions, flowers from Cornwall, from the north of England and from Scotland, and they arrive without the least decay. They are placed in wooden or tin boxes, having an internal arrangement of small phials, fixed under a covering of tin or wood, perforated with holes, just large enough to admit the stalks of the flowers, the ends of which are placed in the water of the phials, and in this way they are conveyed with perfect safety.

Flowers should not be cut during sunshine, or kept exposed to the solar influence; neither should they be collected in large bundles and tied tightly together, as this invariably hastens their decay. When in the room where they are to remain, the ends of the stalks should be cut clean across with a very sharp knife (never with scissors), by which means the tubes through which they draw the water are left open, so that the water ascends freely, which it will not do if the tubes of the stems are bruised or lacerated. An endless variety of ornamental vessels are used for the reception of such flowers, and they are all equally well adapted for the purpose, so that the stalks are inserted in pure water. This water ought to be changed every day, or once in two days at the furthest, and a thin slice should be cleanly cut off from the end of each stalk every time the water is removed, which will occasion fresh action and revive the flowers. Water, about milk warm, or containing a small quantity of camphor, will sometimes revive decayed flowers. The best method of applying this, is to have the camphor dissolved in spirits of wine, for which the common camphorated spirits of the druggists' shops will be quite sufficient; and to add a drop or two of this for every half ounce of water. A glass-shade is also useful in preserving flowers; and cut flowers ought always to be shaded during the night, and indeed at all times when they are not purposely exhibited. The following are some of the genera of plants the flowers of which remain longest after being cut:—*Gnaphalium*, *Astelma*, *Helichrysum*, *Phœnocoma*, *Aphelexis*, and others, which the French have designated "immortal flowers," from remaining unchanged by decay, hold the first rank. Next to these come the whole natural order, *Proteaceæ*, many of *Gramineæ*, several of *Cruciferæ*, several in *Rhamneacæ*, several in *Cassuviæ*—the genus *Acacia* in *Leguminosæ*, all *Calycanthaceæ*, most of *Myrtaceæ*, most of *Dipsaceæ*, several of *Compositæ*, most of *Ericeæ*—the genera *Lavendula*, *Sideritis* and *Phlomis*, in *Labiatæ*, all *Orobancheæ*, all *Plumbagineæ*, all *Amaranthaceæ*, many of *Orchideæ*, *Strelitzia*, and *Heliconia* in *Musaceæ*.

INSECTS AND DISEASES OF HOUSE PLANTS.

Plants in rooms, especially geraniums and roses, are very liable to be attacked by aphides. These may be easily removed by tobacco smoke or tobacco water; and where the smell is not offensive, smoke blown from a common tobacco pipe is as effectual as any other method. Camphorated water may be used by those who dislike the smell of tobacco. Mildew, occasionally, though rarely, attacks house plants. It appears like a white powder, and is supposed to consist of minute fungi; but these fungi are not the original disease, but its consequences, and their appearance shows that the plant has been in impure air or otherwise improperly treated. Sulphur or camphor will effectually remove this mildew; and a scaly insect of the coccus tribe, which appears occasionally on oranges, camellias, and similar plants, may be removed by a sponge and water.

Many persons have a dislike to plants in houses as being unhealthy; and as this dislike is in a great measure groundless, we may notice it. Dr. Priestley was the first to show that the leaves of plants absorb carbonic acid gas by their upper surfaces, and give out oxygen by their under ones, thereby tending to purify the air in as far as animal life is concerned; because carbonic acid gas is pernicious to animals, and oxygen is what that life acquires. It is in the light, however, that these operations are carried on; for in the dark, plants give out carbon; and this may be one reason why plants grown in the dark have little or no charcoal in their substance. It does not appear, however, that any of the scentless products given out by plants are injurious to human beings; because those who live among accumulated plants are not less healthy than others; though many persons feel dislike and even pain from the odors of particular plants, in a way not very easily accounted for.

On the Continent in general, and in France and Germany in particular, flowers of all sorts, but particularly the most fragrant, are admitted into the saloons, chambers, and even bed rooms of people of all classes; and they, rather than complain of any ill effects arising from their presence, complain more of the difficulty of procuring them in sufficient abundance. The flowers most in demand for the chambers of the French and Germans are, oranges, jasmine, carnations, honey-suckle, mignonette, olive, rocket, rose, violet, wall-flower, rosemary, stock, lavender, savory, oleander, hyacinth, lilac, syringa, heliotrope, narcissus, &c., all sweet-smelling flowers; and these they indulge in to a very considerable extent.

We may safely conclude, then, that plants admitted into rooms to the extent that they are in general, can produce no effect injurious to the health of persons in general, but, on the contrary, will afford amusement to the mind and exercise to the body, both of which are so necessary towards the enjoyment of good health. The mind will be agreeably exercised in contemplating the beauty of the flowers, but more so still if the study of their respective parts, natures and structures, in a botanical or physiological point of view, be at the same time attended to. An agreeable and rational exercise will be provided for the body, if the proprietor, particularly if of the softer sex, take the entire management of her little *Window Garden* into her own hands.

CHAPTER IX.

DOMESTIC GREENHOUSES.*

BEFORE entering on a description of this apparatus, the circumstances under which it was discovered may be briefly adverted to. Mr. Ward, the gentleman to whom we are indebted for the discovery, is a surgeon, residing in Wellclose Square, London. From his earliest youth Mr. Ward has been attached to botanical pursuits; but living in a densely populated neighborhood, surrounded with manufactories, and enveloped in the smoke of London in its very worst form, he had been compelled to give up the cultivation of plants, until the following simple incident seemed to point out a mode by which he could follow his favorite amusement with some degree of success. He had buried the chrysalis of a sphinx in some moist mould, which was inclosed in a glass bottle covered with a top. In watching the bottle from day to day, he observed that when exposed to the warmth of the sun the moisture rose from the mould, and became condensed on the inner surface of the glass, and again fell back upon the mould during the night, thus keeping up a continual moisture in the atmosphere within the glass; he also observed about a week prior to the final change of the insect, a seedling fern and grass appear on the surface of the mould. After having secured the insect, Mr. Ward set himself to observe the development of these plants in this confined situation. He placed the bottle outside the window of his study, where the plants continued for several years to exhibit a healthy vegetation, suggesting at the same time further experiments, which have led to a most extraordinary result, when we consider, that by this simple application of the laws of nature as regards atmosphere, the most forbidding local circumstances may be overcome, and that any person, whether inhabiting the most humble or the most splendid dwelling, provided it be freely exposed for a few hours every day to the sun's light, has it in his power to rear and cultivate a miscellaneous collection of plants, to enjoy the beauty of their appearance, and to watch their progress through all the stages of their growth, at an expense so insignificant as to be within the means of every man even in very moderate circumstances.

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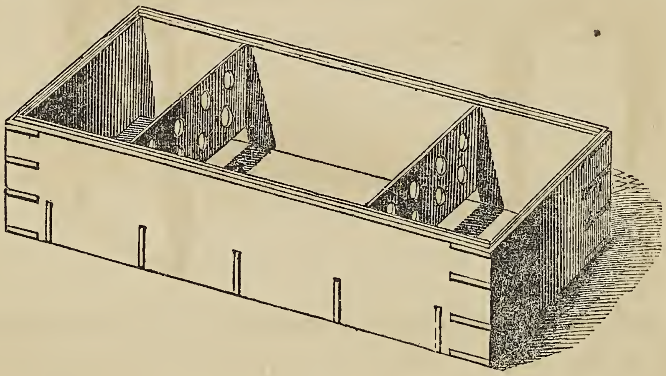
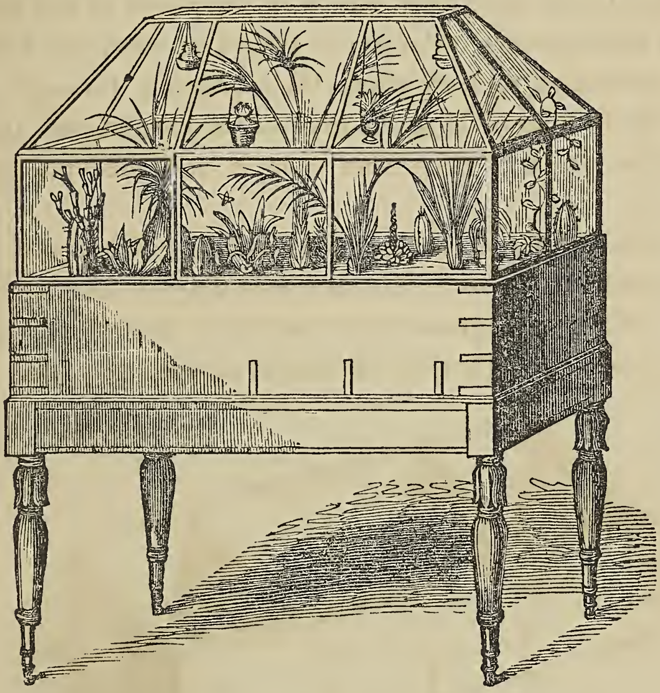
* The materials for this paper are chiefly from Chambers's Edinburgh Journal, with some slight additions from Mr. Ellis's paper read to the Botanical Society of Edinburgh.

To do this he must provide an apparatus consisting of a box, a stand, and a glass roof, of a size according to his desires and means. We shall suppose one is wanted of a small size to stand in a window in an apartment of limited dimensions. The stand,



we will suppose, is one foot ten inches in height, the box whic is to contain the mould eight inches and a half, and the glass frame one foot seven inches and a half;—in all four feet two inches in height by three feet in length and a foot and a half in breath. If elegance is aimed at, the box should be made of mahogany, and supported on four legs, furnished with movable castors; the box which is to contain the soil, eight and a half inches in height, should be made of well-seasoned St. Domingo mahogany, steeped in Kyan's composition, for a fortnight; the sides, one and a quarter inches thick, mitered and dove-tailed together at the corners. The bottom of the box should be Honduras mahogany, one inch thick, formed of numerous small pieces, framed and flush-paneled, and arranged so as best to resist the yielding of the wood. To give it greater strength, two cross pieces or ties stretch from side to side at equal distance from each other; these are dove-tailed on each side, thus dividing the box into three compartments, but leaving open spaces under the



ties and holes through their centers to permit the moisture to percolate freely through the whole of the mould. The bottom being properly fitted, the sides are fixed to it with brass nails—no iron being used in any part. When completed and filled with plants, the apparatus appears something like the cut on p. 93.

At the upper edge of the box a groove is sunk to receive the lower edge of the glass roof which rests securely in it. This groove is lined with brass; its inner lip is one sixteenth of an inch lower than the outer, and at each end is a notch one fifth of an inch only above the bottom of the groove to allow the condensed moisture which trickles down the inside of the glass to flow back into the mould.

The frame-work cover of which we have now to speak is made of brass, with a door on one side, made to fit close. The glass used for it may be of flattened crown-glass; that for the door should be plate-glass. The panes must be fitted in the frames with great care, and with a putty specially made for the purpose, which should, when dry, receive three coats of paint. Along the top of the roof, hooks or brass rods may be placed, from which small pots may be suspended. The whole of the frame-work should be well fitted, and nicely put together, so as to preclude as far as possible all interchange between the air in the case and that in the room.

We now come to the preparation for the plants. Lay the bottom of the box with pieces of broken earthenware, to a depth of two inches, as an open subsoil. Next, lay a stratum of turfy loam one inch deep, and fill in the remainder of the space with soil, composed of equal portions of peat and loam, mixed with about one-twentieth part of rough white sand, free from iron The artificial garden-plot is now ready to receive the plants. Plant these in the usual manner, and then shower over them, with a fine rose watering-pot, from three to four gallons of water, till the soil be pretty well saturated, and the liquid begins to run off by the two openings in the bottom. After draining thus for twenty-four hours, cork up the holes, place the glass-case on the box, and the operation will be finished.

After the first preparation, the plants require little or no care; the case need only be opened for the removal of dead leaves, or for a little trimming, when required. Plants in open flower-pots are exposed to the vicissitudes of change of climate, and require constant watering; but the plants in these cases seem to be independent of any change of temperature in the air, and water themselves. The moisture rises by the sun's influence from the moistened earth, cherishes the leaves of the plants in its aerial condition, and during the cool of night falls to the earth again like rain or dew. In this manner there is a constant succession of rising and falling of moisture, in imitation of the great processes of nature, daily going on in the fields around us. The plant-case is a little world in itself, in which vegetation is supported solely by the resources originally communicated to it.

Not the least remarkable part in the economy of the case is the preservation of atmospheric purity. To all who reflect for the first time on this subject, it will seem incomprehensible how the plants can possibly thrive and blossom without the occasional interchange of fresh air with the atmosphere. This certainly does appear extraordinary, yet it is ascertained by experiment that no such reinvigoration is requisite. To account for the phenomena, it will be necessary to explain the constitution of atmospheric air, and the means adopted by nature for its purification.

Air consists of three gases in close mechanical union—nitrogen, oxygen and carbonic acid, in the proportion of about 79 of nitrogen, 20 oxygen, and 1 of carbonic acid, in 100 parts of pure air. In this mixed composition, the essential element for the support of respiration in both animals and plants, and also for combustion, is the oxygen, the nitrogen being little else than a diluent to modify the strength of the oxygen. It was long believed by men of science that plants possessed the power of exuding oxygen, and so formed a prime agent for restoring vitiated air to purity. Later investigations, however, chiefly by French chemists, have made it evident that plants have no such power, unless when placed under the influence of the sun's rays, or, in other words, that solar light is the grand cleanser of the atmosphere, and without which both plants and animals languish and die. With respect to plants in particular, it is ascertained that, while inhaling oxygen and expiring carbonic acid, their leaves possess the remarkable property, in conjunction with the sun's light, of re-transforming the carbonic acid into oxygen. At night, when the light of day has departed, the expired carbonic acid may be detected in the neighborhood of plants; and hence one cause of injury to health by breathing night air; but when the morning sun again bursts upon the scene, a great chemical process commences in the atmosphere—the carbonic acid is decomposed, oxygen is evolved, and all nature rejoices in a recreation of its appropriate nourishment.

A question will here readily occur—what species of plants are best adapted for these domestic greenhouses? We are fortunately enabled to answer this inquiry by referring to a learned paper on the subject by Mr. Ellis, which was read to the Botanical Society of Edinburgh, January 13, 1839, and afterwards published in the Gardener's Magazine, and also as a separate pamphlet. According to this gentleman's statement, the plants most suitable are "those which partake largely of a cellular structure, and possess a succulent character, and especially those which have fleshy leaves; whilst, on the contrary, the continued humidity is unfavorable to the development of flowers of most exogenous plants, except such as naturally grow in moist and shady situations." Plants, therefore, which have to grow and bloom in cavernous and moist situations, or in moist and warm climates, are best adapted for these cases. However, within this class of vegetables there are many beautiful and highly luxuriant plants, which it would afford no small pleasure to contemplate. The following is a list of plants from various countries, which were set in a box, under Mr. Ellis's directions, and examined from nine to twelve months afterwards:

BOTANICAL NAMES.	COUNTRY.	REMARKS.
*C*hamæ'rops humilis	Italy, Sicily, Spain	Increased 1-4th its original size
*C*enti*ana* verna	England	Flowered, but no difference in size
*A*diantum *C*apillus Veneris	England	Increased 1-8th
Primula farinosa	Scotland	Flowered; atmosphere rather damp for it
Primula scotica	Scotland	Flowered; atmosphere rather damp for it
*V*erbascum Mycon*i*	Scotland	Increased 1-8th
*A*ndrosace villosa	Scotland	Flowered; not very healthy
*C*hamæ'rops *Palmetto*	Carolina	Increased 1-3d
Dionæ'*a* Muscipula	Carolina	Made 1-8th
Sarracen*ia* purpurea	Carolina	Increased 4 times its original size
Epigæ'a repens	Carolina	Increased one-half
Testudinaria elephantipes	Cape of Good Hope	Made a shoot 10 inches long
A'loe retusa	Cape of Good Hope	Made 1-3rd, showing flower spikes
*R*hododendron chrysanthum	Siberia	Increased one-half
Chamæcistus	Austria	Increased 1-3d
*C*ycas revoluta	China	Increased 1-8th
*N*epenthes distillatoria	Ceylon	Increased 2-3ds
Cypripedium venustum	Nepal	Increased 1-5th
insigne	Nepal	Increased 1-4th
Agave geminiflora	Mexico	Increased 1-3d
*Goodyer*a* discolor	Mexico	No perceptible difference
*Echinocactus multiplex	Mexico	Increased one-half
*peruviana	Mexico	Increased one-half
myriacantha	Mexico	Increased one-half
*formosa	Mexico	Increased 1-3d
O'tton*i*	Mexico	Increased 1-4th
candida	Mexico	Increased one-half
Epiphyllum truncatum	Brazil	Increased 2-3ds
Cereus flagelliformis	Peru	Increased one-half
Lycopodium stoloniferum	Cuba	Very luxuriant

Those marked thus * are growing in fancy pots, and suspended from the roof of the plant-case.

The alternate action of vitiation and purification is emphatically described as follows by Mr. Ellis, in the pamphlet before us:— "Under a bright sunshine, the two processes by which carbonic acid is alternately formed and decomposed go on simultaneously; and their necessary operation, in as far as regards the condition of the air, is that of counteracting each other. Hence, though both may be continually exercised in favorable circumstances, the effects of neither on the atmosphere can be ascertained by ordinary means; and, consequently, though, in the experiments of De Saussure with common air, the production and decomposition of carbonic acid by plants in sunshine must have been continually going on, yet, in all the analysis which he made, the air was found unchanged, either in purity or volume; in other words, the processes of formation and decomposition of this acid gas exactly counterbalanced each other.

"Of the two processes which have now been described (continues our authority), each may be considered as in its nature and purpose quite distinct from the other; hence their efforts may be readily distinguished; neither do they necessarily interfere, when actually working together. The first or deteriorating process, in which oxygen gas is consumed, goes on at all times and in all circumstances when vegetation is active. It requires always a suitable temperature in which to display itself; and when that temperature falls below a certain point, which is very variable in regard to different plants, the process is more or less completely suspended, again to be renewed when the temperature shall return. This conversion of oxygen into carbonic acid is as necessary to the evolution of the seed as to the growth of the plant, and is all that is required for germination. But the plant requires something more; for if light be excluded, vegetation proceeds imperfectly, and the plant does not then acquire its proper color and other active properties which it ought to have. The chief organs by which the consumption of oxygen gas is effected are the leaves; and its purpose, in great part at least, seems to be that of producing some necessary change in the sap during its transmission through those organs, on its way from the vessels of the wood to those of the inner bark, whereby it may be rendered fit for the purposes of nutrition and growth. In its nature and object, therefore, as well as in the specific change which it produces in the air, this process closely resembles the function of respiration in animals, and may thus with propriety be deemed a physiological process. The second, or purifying process, in which oxygen gas is evolved, differs in all respects from that which has just been described. It is in a great measure independent of temperature; at least it proceeds in temperatures too low to support vegetation, provided light be present—an agent not required for germination, nor essential to vegetable development. The organs by which this process acts on the air are, as before, the leaves; not, however, by changing the qualities of the sap in the vessels of those organs, but by producing changes in the chromule, or colorable matter, in their cells, to which it imparts color and other active properties. In doing this, it does not convert the oxygen gas of the air into carbonic acid, but, by decomposing that acid gas, restores to the air the identical portion of oxygen of which the former process had deprived it. The former process, carried on by the agency of the oxygen gas of the air, was essential to living action, and affected the well-being of the whole plant; that exercised by the agency of light is not necessary to life, is local, not general in its operation, and is capable of proceeding in circumstances and under conditions incompatible with living action. By withdrawing the air altogether, or depriving it of oxygen gas, vegetation soon ceases through the whole plant; but the exclusion of light from any part of the plant affects that part only; and even the total exclusion of that agent only deprives the plant of certain properties necessary to its perfection, but not essential to its life. These differences in the processes by which oxygen gas is alternately consumed and evolved, during the vegetation of plants in sunshine, are so manifest, both in their nature and effects, as to satisfy the ascription of a name to the latter process distinct from that given to the former. It might, perhaps, be denominated the chemical process, in contradistinction to that named physiological.

"It would contribute much, we think, to simplify our inquiries concerning vegetation, to bear in mind these distinctions; to consider the one process as accomplished by the agency of the air, and essential to the life and growth of the plant; the other, as subordinate, depending on the agency of light, and though necessary to the perfection of vegetation, yet not essential to its existence. In this manner each process may be followed out separately, both in regard to its immediate effects and remoter consequences, without clashing with the other; and the apparently discordant and even contradictory phenomena which on a first view they seem to exhibit, may be reconciled, and considered, not less in theory than in fact, as conspiring together to form one harmonious and perfect whole."

After these explanations, little need be added respecting the supply of pure air to domestic greenhouses. The deterioration of the atmosphere in the case is daily counteracted by an opposite process of purification, so that amidst the vicissitudes of perpetual change, the air is maintained in a state of nearly uniform composition and purity, and serves over and over again for all the purposes of vegetation. It may, however, be stated, to prevent misconception, that the more pure the air of the apartment, the plants will have the better chance of thriving, because there must necessarily be an interchange to some extent betwixt the air of the room and the case, in consequence of the daily expansion from heat, and nightly condensation from cold. This interchange will be effected by the minute crevices in the apparatus, and therefore requires no special provision.

CHAPTER X.

MONTHLY NOTICES.

A RECAPITULATION of the work which each month presents to the gardener's notice will be useful. By occasionally glancing over the Monthly Notices, the memory is refreshed; and it will be found that even the three winter months allow the young gardener no remission from labor. There is something to be done in every week in the year—something to be attended to, which amuses the mind, interests the imagination, and benefits the general tone of mental and physical health.

JANUARY.

Let your *lawn* and *grass walks* be kept neat and smooth, by rolling, this month; and if any part of the grounds require fresh turf, this is the season for cutting and laying it down. If you live in the neighborhood of a common, that is the best ground for cutting turf, as the herbage is short, and free from nettles, docks, &c. Lay it down firm and even, allowing for the sinking of the newly-laid earth, about an inch or two. Roll it well, after having laid down the turf.

Keep the *gravel walks* also from weeds and moss, and roll them in dry weather. If you attempt to roll gravel in wet weather, the gravel clings to the roller.

Dig the clumps or spots where you mean to plant evergreens, in February and March, that the ground may be trenched in readiness. The frost of this month will render newly-dug earth more friable, and the snow will enrich it.

If the weather is very settled and mild, you may still plant out hardy deciduous shrubs, such as sweetbriars, double bramble, double-blossomed cherry, dwarf almond, jasmines, honeysuckles, roses, lilacs, laburnums, guelder rose, Spiræa frutex, mezereons, &c. Transplant each shrub with a good ball of earth round its roots.

Prune flowering shrubs now, where they require it, with a sharp knife, not with shears. When I say "flowering shrubs," I do not mean shrubs *in* flower, but shrubs that *do* flower.

Transplant suckers from the hardy flowering shrubs, if they have not been done before. Take them up with good roots, and support them neatly with stakes.

Cuttings of young shoots of hardy deciduous shrubs may be planted in mild weather, to root, and form good plants in the autumn. Layers may be also formed.

Protect all the choicer kinds of flowering shrubs, and all cuttings of every kind, from severe frosts, by spreading litter over them.

Plant tulips now—always providing the weather is mild—to blow late in the year; but they will not be so handsome as those which were planted again in September and October.

Plant any ranunculuses, anemones, &c., you may have out of the ground, to come in late blowing; but, like the tulips, they will not bear such fine blooms. Protect everything from severe weather, as well as you can, this month, particularly your choicer sorts of bulbs, and tuberous-rooted perennials.

FEBRUARY.

February is the first spring month, and the parterre will begin to make gradual approaches to gaiety and life. The anemones, hepaticas, &c., will now bud and flower, if the weather is genial; and the crocus and snowdrop will put forth their blooms to meet the sun on his returning march.

About the end of this month, you may begin to sow the hardy annuals. I prefer April, but it may not be convenient always to wait so long; therefore sow now the seeds of hawkweed, lavatera, Venus's looking-glass, Venus's navelwort, candytuft, larkspurs, lupines, convolvulus, flos Adonis, dwarf lychnis, nigelia, annual sunflowers, &c.

This month, you may plant and transplant, fearlessly, all hardy, fibrous-rooted flowering perennials and biennials, such as saxifrage, gentianella, hepaticas, violets, primroses of all sorts, polyanthuses, double daisies, thrift, &c.; rose campions, rockets, campanulas, sweet-williams, hollyhocks, scarlet lychnis, carnations, pinks, monk's-hood, perennial asters and sunflowers, &c.

Plant cuttings of roses, honeysuckles, and jasmines.

If the weather is mild, you may transplant many kinds of evergreen shrubs, such as phillyreas, alaternuses, laurels, laurustinus, pyracanthas, cistuses, &c. Let there be a ball of earth round their roots, when you take them out of the ground.

If box edging is required, plant it now; water it, and the plants will soon root.

Dig the borders, carefully and lightly, with your garden fork; make the garden look neat, and free from weeds; clear away dead leaves; sweep the lawn and walks; and let spring advance in its proper order.

MARCH.

Now plant away. Evergreens cannot be moved at a better period. Deciduous flowering shrubs may also be still planted, such as Althæa frutex, syringas, roses, honeysuckles, mezereons, sumach, laburnums, lilacs, jasmines, candleberry myrtles, guelder roses, &c.

Where the borders require filling up, the following plants may still be moved, but do it early in this month :—

Lychnises, campanulas, Canterbury bells, tree primroses, rockets, sweet-williams, wallflowers, columbines, monk's-hood, rose campions, perennial asters and sunflowers, foxgloves, &c.

Sow perennial and biennial flower seeds about the last week in this month. Stake your hyacinths, when the flower stems are tall..

Plant out layered carnations of last year, into the places where they ought to remain.

Give fresh earth to any plants in pots, such as carnations, pinks, auriculas, double sweet-williams, double stock gillyflowers, rockets, &c.

Sow annuals of all hardy kinds.

Transplant any hardy roses, which you may wish should blow late in the year.

Plant box, for edgings, still; and roll the lawn and grass walks.

Transplant any tenderer kinds of annuals which you may have been at the pains of raising in, or procuring *from*, a hot-bed.

Keep the garden quite free from weeds and dead leaves.

APRIL.

Now place sticks to every plant or stalk requiring support. Fix the sticks, or light iron rods, firmly in the ground; and tie the stems to each stick neatly, in two or three places.

Some *evergreens* may yet be removed, as laurels, laurustinus, Portugal laurel, cistuses, arbutus, magnolias, pyracanthas, &c.

Propagate auriculas, by slipping off their suckers and offsets, this month.

Sow carnation and polyanthus seeds still. Sow, also, perennial and biennial seeds.

Where any perennial or biennial fibrous-rooted flowers are wanted, transplant them only in the first week of this month, and they must have each a good ball of earth attached to them; but this work should be completed in February, or March at farthest.

Every sort of annual may now be sown.

Take care of your hyacinths, tulips, ranunculuses, and anemones now, for they will be hastening into bloom.

Place your auriculas, hyacinths, &c., which may be in pots, in a sheltered place, during heavy rains or winds; and shelter those flowers which are in the borders as well as you can. Trim them from dead leaves.

Keep your lawn and grass walks nicely mown and rolled, and your borders free from weeds and rubbish.

MAY.

Propagate perennial fibrous-rooted plants by cuttings.

Propagate double wall-flowers by slips of the young shoots of the head.

Sow annuals for succession; such as sweet-peas, nasturtiums, lavatera, lupines, flos Adonis, &c.

Take up those hyacinths, tulips, &c. which have done flowering, and dry them in the shade to put away.

Weeds grow quickly now: hoe them up wherever you see them. Support all flowers with sticks; train them upright. Clear away all the dead leaves from your carnations, and gently stir the earth round them with your smallest trowel.

Look round the borders now, and take off irregular shoots.

JUNE.

Propagate carnations by layers and pipings. Propagate double sweet-williams and pinks by layers and cuttings, or slips.

Propagate perennial fibrous-rooted plants by cuttings of the stalks.

Transplant the large annuals from the seedling bed to the places where they are to remain. Let this be done in showery weather, if possible.

Take up all bulbs, ranunculuses, and anemone roots, &c., as the flowers and leaves decay.

Water the delicate plants, if the weather proves dry: give a moderate watering every evening, but never in the heat of the day.

Sow yet some hardy annuals, such as ten-week stocks, virgin stock, &c.

Plant out China-asters, Chinese hollyhocks, ten-week stocks, large convolvolus, &c., but let each root have a ball of earth round it.

Examine the perennial and biennial plants, to cut off all dead, broken, or decaying shoots. Trim the African and French marigolds from their lower straggling shoots, that they may present a neat, upright appearance. Trim the chrysanthemums, which are apt to branch too near the root, and stake them neatly.

Plant out carnations and pink seedlings into their proper places.

Keep everything just moderately moist, if there is a long drought in this month.

JULY.

You may lay carnations and double sweet-williams still; but let it be done before the end of the second week in this month.

Propagate pinks by slips and pipings

Transplant the seedling auriculas which were sown last year, as also the seedling polyanthus.

Transplant the perennial and biennial seedlings which were not done last month, to remain till October.

Take up all bulbs as fast as they decay their leaves. If this month prove hot and dry, place your potted carnations in a sheltered situation, and keep them just moist.

Support flowering shrubs and plants, and cut away decayed stems. Keep the borders clean. Mow the lawn and grass walks. Plant autumnal bulbs.

AUGUST.

You may now begin to propagate some double-flowered and approved fibrous-rooted plants the end of the month, if they have done flowering—such, for instance, as the double rose campion, catchfly, double scarlet lychnis, double rocket, double ragged robin, bachelor's buttons, gentianella, polyanthuses, auriculas, &c.

Sow auricula and polyanthus seed on a warm, dry day; and remove carnation layers to some place where they may remain till October to gain strength.

Sow seeds of bulbs.

Sow anemone and ranunculus seed.

Remove all bulbs which have done flowering.

Cut and trim edgings of box. Clip holly, yew, and privet hedges.

Gather flower seeds.

Plant autumnal bulbs, if any are still above ground, such as colchicums, autumnal narcissus, amaryllis, and autumn crocus.

Trim the flower plants; mow the lawn and grass walks, and keep every department in neat order.

SEPTEMBER.

Transplant, in any moist or showery weather this month, the perennial and biennial seedlings to their proper situations, with a ball of earth round their roots.

Propagate fibrous-rooted plants.

Prepare the spots where you mean to deposit anemone and ranunculus roots any time between the end of this month and the end of October; and dig all beds and borders which are vacant, to prepare them also for receiving roots and plants next month.

Transplant peonies, flag irises, monk's-hood, fraxinella, and such like plants, to part their roots and remove each root to its destined position.

Transplant evergreens.

Plant cuttings of honey-suckles, and other shrubs.

Plant hyacinth and tulip roots for early spring bloom.

Plant box by slips or roots.

Mow grass lawn and walks. Clear away flower stems, and trim flowering plants.

Sow seeds of bulbous flowers, if not done last month.

OCTOBER.

This is a very busy month; for the garden should now be cleared and arranged for the season.

Transplant all sorts of fibrous-rooted perennial and biennial plants now where they are intended to remain.

Put the bulbs into the ground again; and transplant the different layered plants into their respective places.

Prune flowering shrubs of all sorts. Plant and transplant all hardy deciduous shrubs, and their suckers.

Dig up and part the roots of all flowers which require so doing, and replant them.

Plant cuttings of honeysuckles, laurels, &c.

Take up the roots of dahlias, and put them carefully away till May.

Trim evergreens.

Plant box edgings; cut away the long, sticky roots, and trim the tops even.

Mow grass walks and lawns, and weed gravel walks.

NOVEMBER.

Prepare compost for a new year by raking dead leaves, soil, sand, &c., in a heap, to turn well over occasionally. Pour the brine, soap-suds, &c., from the house over it.

Transplant still all hardy kinds of flowering shrubs, suckers, &c.

Clear the borders from dead annuals, leaves, stumps, &c.; shelter the choice bulbs and double-flowering plants.

DECEMBER.

Take care of every thing. Protect the more delicate roots from severe frost, by strewing ashes, sand, or litter over them. Prune shrubs, and dig between them.

If the weather is open, you may still plant hardy sorts of flowering shrubs.

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A BOOK FOR EVERY BOY IN THE COUNTRY.

ELEMENTS
OF
AGRICULTURE:

FOR THE

USE OF PRIMARY AND SECONDARY SCHOOLS

BY

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Director of the Normal Primary School of the Meurthe, Member of the Royal and Central Societies of Nancy and Aurilliac.

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APPROVED AND RECOMMENDED BY THE GOVERNMENTAL COUNCIL
OF THE DEPARTMENT OF THE MEURTHE.

TRANSLATED AND ADAPTED TO THE USE OF THE RURAL PRIMARY SCHOOLS OF THE

UNITED STATES OF AMERICA.

BY F G. SKINNER.

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Dedicated,

BY THE TRANSLATOR,

WITH UNAFFECTED RESPECT, AND A HIGH SENSE OF THE
TRUE DIGNITY OF THEIR PROFESSION,

TO

THE TEACHERS OF YOUTH

IN

THE UNITED STATES:

The followers of a pursuit the most responsible and honorable, when properly understood; and yet, in proportion to its importance, the least honored and the worst paid, of all others.

PREFACE.

When it is considered that a very large majority of the millions who are constantly in training at our country schools are to be cultivators of the soil, and that on their general intelligence, with some knowledge of the principles of their own profession, must in a great measure depend, not only the prosperity of American agriculture, but the permanence of our free institutions; every lover of his country must reflect with regret on the want of more diffusive and perfect systems of general education, and especially on the absence of a *plain, intelligible, elementary work on the principles of agriculture*, for the use of our common schools. This want, it is now confidently believed, has been supplied by what is here offered, entitled "Elements of Agriculture for the Use of Common Schools," which has lately appeared in France, under the auspices of the department for public instruction, and been sanctioned, as will be seen, by the strong recommendation of men of the highest distinction and authority for learning and benevolence

This little work is purely elementary in its character, and so plainly written, that while the principles are brought within the comprehension of children who have attained their twelfth year, it can not fail to be entertaining and auxiliary, if not instructive to their teachers. If in itself it does not make those who study it accomplished agriculturists, it will at least pave the way for their becoming such, by explaining the rudiments of those sciences with which Agriculture is naturally connected

As will be perceived, by reference to the table of contents, the work is divided into three Parts. The first treats of Natural History, explaining, in a clear and simple manner, the difference between Organic and Inorganic Substances, Animal and Vegetable Life, Vegetable Reproduction, &c. The Second Part treats, in like perspicuous and intelligible style, of Climate, and its effects upon animal and vegetable life. Mineral Manures, more properly called by the French writers *ameliorators*, and Animal and Vegetable Manures, with their management and application, make up the Third Part. Finally, it has been slightly modified, as was needed, to adapt it to the soil and climate of the United States.

REPORT

MADE TO THE CENTRAL AGRICULTURAL SOCIETY OF THE MEURTHE.

Gentlemen:—Two of your new colleagues, Mr. Bentz, Director of the Normal Primary School of the Department of the Meurthe, and Mr. Chretien, Professor of Rural Economy in the same school — both honorary members of the Central Agricultural Society of Nancy — have just published an elementary work on the science that you cultivate. I have been appointed to examine, and report upon this work — a duty that I most cheerfully undertake. I must, however, be first permitted to declare, that with me it is a subject of some delicacy, inasmuch as I have myself published two works having the same object in view with that of Messrs. Bentz and Chretien; it shall not, however, prevent me from stating candidly the impression made upon my mind by their publication.

I have read, with attention and continued interest, the "Elements of Agriculture for the Use of Primary Schools." The first observation that struck me was, that they had been faithful to their title-page. Thus, we find nothing in their work that is not absolutely elementary, but sufficient, nevertheless, for the object in view. The teacher may with confidence draw upon its pages for all that seems to be of primary necessity, for himself first, and then for the children or adults confided to his care. Another thing that we remarked on opening the new work of our honorable colleagues, is the insertion at the end of each subdivision of a chapter, of a series of questions, so skilfully put, as to compel the reader or scholar to review, involuntarily as it were, the subject upon which his attention has for a moment been directed. This is a happy idea — an innovation that may bear good fruit; and we do not hesitate to aver, that the complete absence of replies seems to us the more judicious, as it compels, in the formation of these replies, an exercise of both the judgment and memory. You will not fail to remark, gentlemen, that there must inevitably result to the pupil, from this method of proceeding, three important advantages — the obligation to read attentively each lesson; the compulsory exercise of two intellectual faculties, the development of which is in a direct ratio with the use that is made of them; and finally, the habit of rendering to ourself an account of what is read — a species of exercise that leads to thought and meditation.

The division adopted by the authors seems to us simple, proper, and logical. In the first part, they commence by giving us all the requisite knowledge of natural history, and then some general ideas on the cultivation of the soil, the physiology and anatomy of plants, and finally on vegetable reproduction. The second part is devoted to the study of the soil in general, and to that of its physical properties. The different operations required to bring the soil into cultivation, manures, ameliorators, and stimulants, are the objects of the third part. Under these different titles are arranged the subdivisions, skilfully treated, and entirely within the comprehension of the young readers, for whom the book is destined.

The publication of the second volume depends, the authors tell us, upon the reception that may be given to the first. This reserve, full of modesty and good taste, reveals to the Society not only the value of its new colleagues, but the zeal with which it should encourage and promote their labors. However, gentlemen, this sympathy and encouragement have recently been generously manifested, by the governmental council of our department, for the elementary work that we have the honor to report upon; the council having ordered the expenses of printing the work to be defrayed out of the fund appropriated by government for the encouragement of agriculture.

If, on the one hand, this intelligent vote is a just and proper reward for a useful work, it will also enable its publishers to furnish it at a less cost than they otherwise could. Thus, gentlemen, by our co-operation with the general council of the department, we at once render an act of justice to the authors, and make manifest the interest that we feel, not only in the teachers and the scholars of the country, but also in the success of primary and secondary instruction in matters appertaining to agriculture. C. MANDEL.

Report adopted, and ordered to be printed.

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PART FIRST.

CHAPTER I.

General Notions on the Art of cultivating the Soil, and of the different Objects that exist in Nature.

LESSON I.

DIVISIONS IN THE ART OF CULTIVATION.

1. *The Art of Cultivation.*—The object of this art is to obtain from the earth the greatest possible quantity of products; and it is usually divided into four parts, namely: 1 Agriculture, or the cultivation of fields. 2. Horticulture, or the cultivation of gardens. 3. The cultivation of the grasses. 4. Arboriculture, or the cultivation of trees.

2. *Agriculture.*—The principal aim of agriculture is to produce those plants that are most generally used as food, by man and domestic animals; such as wheat, Indian corn, rye, barley, oats, as also potatoes, beets, turnips, clover, lucerne, etc. Among the products of agriculture are also to be classed what are called the industrial plants, such as flax, hemp, cotton, hops, madder, and others that furnish materials for different manufactures, either at home or abroad. Thus we see that agriculture is the chief foundation of a nation's power, as it not only furnishes man with food and clothing, but also with materials for the mechanic arts, and commerce

3. *Horticulture* has for its object the cultivation of vegetable gardens, and orchards. It flourishes most in the vicinity of cities, as there it not only finds a ready market for its products, but an abundant supply of manures. It is by means of horticulture that the greatest quantity possible of products is obtained ; for several crops are usually taken from the same ground, in the same year.

4. *Arboriculture* treats of the planting, growth, and management of trees. It is a branch of agriculture that will increase in importance with the decrease, now so rapidly going on, in the timber throughout the country.

5. The cultivation of the grasses, for pasturage and hay, is of such well-known importance, that it will be separately treated in this work.

This work is specially devoted to agriculture and rural economy.

6. A knowledge of the principles that it may be necessary to follow in cultivation, is called the theory ; the application of these principles to cultivation, is called practice ; and he who applies them, is called an agriculturist or farmer.

7. In the theory and practice together, consists the art of cultivation. To be a good farmer, it is not only necessary to possess a knowledge of the theory, but also to know how to put it in practice.

QUESTIONS.

1. In what does the art of cultivation consist?
2. How is it divided?
3. What is the principal object of agriculture?
4. What is theory?
5. What is practice?
6. What is a farmer?
7. Does it require a knowledge of the practice and theory both, to make a good farmer?

LESSON II.

THE DIFFERENT OBJECTS EXISTING IN NATURE.

8. The art of agriculture requires some knowledge of the different objects that exist upon the surface, and in the interior of the earth. It presupposes, consequently, some acquaintance with natural history, and principally with botany, a science that treats of plants and their properties.

9. All bodies that exist upon the surface, or in the interior of the earth, are divided into three classes, called the kingdoms of nature, namely: 1. The animal kingdom, which includes man and all animals. 2. The vegetable kingdom, in which are included all vegetables, from the largest tree to the smallest plant. 3. The mineral kingdom, to which belong all rocks, stones, earths, and metals.

10. Among the beings that exist, some are endowed with life, such as men, animals, vegetables, or plants; the others are inanimate, or without life, as minerals, rocks, earths, etc. The first are called *organic bodies;* the second, *inorganic bodies.*

11. The organs are those parts of a body created for the maintenance of life.

12. It is easy to establish the distinction that exists between the beings of the three kingdoms. Those that belong to the animal kingdom grow, live, feel, and are gifted with the faculty of moving themselves, or *locomotion.* Those of the vegetable kingdom grow, and live; a proof of this last property is the faculty that they possess of nourishing and reproducing themselves. Those of the mineral kingdom grow only, and this growth takes place in a manner contrary to that of organized bodies. These last increase always from the interior to the exterior, whereas minerals increase by the addition to their surface of small particles that adhere to them.

13. The life of animals and vegetables exhibits a difference worthy of remark; it is that vegetables seem to be endowed with the reproductive power in all their parts. Thus, when the limb of a tree is cut off and planted in the earth, it may produce another tree. This is not the case with animals.

14. Minerals, and other brute bodies, united in large masses in the bosom of the earth, form rocks that are in a continual state of decomposition. The particles derived from this decomposition constitute, by their mixture with organic remains, the different species of soil that are cultivated. In other words, *soils are composed of a mixture of organic and inorganic remains.*

QUESTIONS.

1. The art of agriculture presupposes a knowledge of what?
2. What is botany?
3. Into how many kingdoms is nature divided?
4. What are organic and inorganic bodies?
5. What are organs?
6. How do we distinguish between the beings of the three kingdoms?
7. How do inorganic bodies increase?
8. What remark can be made upon animal and vegetable life?

CHAPTER II.

Vegetable Anatomy and Physiology.

LESSON III.

THE ORGANS OF PLANTS.

15. To enable the farmer to obtain the greatest possible yield from his land, it is necessary that he should know the different plants that can be cultivated to the best advantage, according to the circumstances in which he finds himself placed. It is equally useful to know how to distinguish the hurtful plants, or weeds, that flourish in his soil. To this end, some notions of botany are necessary; for it is this science (see No. 8) that teaches us the nature and properties of plants. It is particularly when we wish to study the nature of a soil, or introduce a new plant into cultivation, that we feel the importance of a knowledge of botany. Soils, as they may be calcareous, clayey, or sandy, are more favorable to the growth of one plant than another; and it is by an examination of the spontaneous growth, that we are enabled to recognise, almost to a certainty, whether such a grain, or such a plant, will thrive in our soil.

16. Botany is divided into several parts; but those that it is the most important to examine here, are *the anatomy and physiology of plants.*

17. *Vegetable anatomy* treats of the division of the organs of plants, and of their respective positions. *Vegetable physiology* treats of the functions of these organs, and teaches how plants are nourished and reproduced.

18. All the organs do not fulfil the same functions: some serve for *nutrition* — that is to say, they procure for

the plant the food that it requires; the others serve for their *reproduction*

19. The *root*, the *stem*, and the *leaves*, are the organs of nutrition Those of reproduction are the *flowers*, the *fruits*, and the *seeds*. There are, however, as we shall see, when we come to study each one of these organs separately, several that serve, at the same time, for nutrition and reproduction.

QUESTIONS.

1. Why is some acquaintance with botany necessary to the farmer?
2. What does vegetable anatomy treat of?
3. What is the object of vegetable physiology?
4. Do all the organs fulfil the same functions?
5. Which are the organs of nutrition?
6. Which are the organs of reproduction?

LESSON IV.

THE ROOT.

20. The root is that part of a plant that generally introduces itself into the soil, and there sucks up a portion of the substances necessary to the nutrition of the plant. By penetrating into the earth, it serves at the same time to support the plant in position.

21. The whole surface of the root does not concur equally in the function of nourishing the plant. Its extremity is endowed with a greater power of suction than the other parts. The mouth that is supposed to exist at the extremity of roots, is called *spongiole*.

22. There are vegetables, the roots of which do not penetrate the earth, but grow upon other plants. These vegetables are called *parasites*. The mistletoe, that we see upon so many trees, is a plant of this kind.

23. That part of a plant immediately between the roo

and the stem, is called the collar, or neck. Beneath the neck, branch off the small roots, or rootlets, that penetrate the soil in every direction, in search of the organic or inorganic substances that serve as food to the plant.

24. With regard to their duration, roots may be divided into two classes: 1. *Annual roots*, those that perish after having borne seeds, such as corn, carrots, beets, etc. 2. *Perennial roots*, those that live an indefinite number of years, as lucerne, for instance. An annual plant may often be rendered perennial by preventing its ripening its seeds, for it is in forming and maturing the seed that a plant exhausts itself, and perishes.

25. Roots, as regards their shape, may be arranged in four principal classes, namely: The tuberous, like potatoes; the fibrous, formed of small threads that spread at short distances into the soil, like those of wheat; the bulbous, resembling the onion in shape; and the tap-rooted, the most of which are fusiform, such as the beet, carrot, parsnip, etc. From these four kinds, all other varieties seem to be derived.

26. Those plants that are cultivated for their roots are of vast utility, not only as food for man, but also for domestic animals. The cultivation of the potato, the beet, and the turnip, on a large scale, has been of incalculable value to the crowded population of Europe, and has more than once saved them from the horrors of famine. Indeed, the flourishing condition of the agriculture of England is based almost entirely upon their growth. It is to be desired that the American farmer should give them more attention; independent of their value in themselves, their cultivation is the best preparation that land can receive for any other succeeding crop. Roots are drilled, worked with a hoe, the weeds are destroyed, and the land is left clean.

QUESTIONS.

1. What is the root?
2. Does the whole surface of the root contribute to the nourishment of the plant?
3. What is the spongiole?
4. What are parasitical plants
5. What is the collar, or neck?
6. What is an annual root?
7. What is a perennial root?
8. How may an annual be sometimes made perennial?
9. How may roots be classed?
10. Why is it advisable to cultivate roots?

LESSON V.

THE STEM AND LEAVES—FUNCTIONS THAT THEY FULFIL IN THE ACT OF NUTRITION.

27. THAT part of the plant which, starting from the collar, springs erect above the surface of the ground, in search of light and air, is called the stem.

28. Stems are divided into several kinds, depending upon form and substance. Those resembling the stems of trees, bear the name of *trunks;* and those that are hollow and jointed, are called *stubble,* as the stems of wheat, and other cereal plants. There are plants without any stems.

29. When a stem has the consistency of wood, it is called *ligneous;* when it is tender, like grass, it is called *herbaceous.*

30. The parts composing the stems are much more difficult to distinguish in some plants than in others. Thus, in herbaceous plants, they are not easily detected; whereas in trees, we may almost always distinguish the different parts composing the stem.

31. The trunk, or stem, is divided into the following parts: 1. A dry, leathery, tough membrane, the *cuticle.* 2. A cellular layer, adhering to the cuticle, and called the

cellular integument. 3. A *vascular layer.* 4. A whitish layer, apparently of a fibrous texture, the inner bark, which is of a more complicated structure than the other layers. Then the imperfectly formed wood, called *alburnum;* the wood itself; and finally the pith.

32. The leaves are those parts of the plant attached to the stem, or branches, and from which they generally become detached every year. Some are united to the vegetable by means of a stem, called footstalk; and others are attached immediately to the plant, without any intervening link. Many naturalists suppose that it is through the under sides of their leaves that plants absorb the gases that aid in their nutrition.

33. Vegetables procure the elements of their subsistence not only through their roots, but also through their stems and leaves, which in this case play a very important part. They absorb, through their pores,* the nutritious gases contained in the atmosphere. The quantity, more or less, of these principles absorbed, depends upon the organization of the plant, the manner of its cultivation, and the state of the atmosphere.

34. It is principally hydrogen and azote, combined in the shape of ammonia and carbonic acid,† that is absorbed

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* The minute particles that compose a body are called molecules, and the interstices, or open spaces between these molecules, are called pores. All bodies have pores, and are on that account called porous.

† Air is composed of two principal bodies, *oxygen* and *azote.* The result of a combination of oxygen with a simple body, is called an acid. Acids are easily recognised by a sour taste, and the property which they possess of turning vegetable blues to red. Their names differ as the quantity of oxygen entering into their composition is greater or less. Thus, when it exists in the greatest proportion possible, we terminate the name of the simple body in *ic:* but if the quantity of oxygen is not so great, the name of the simple body is terminated in *ous* — e. g., *sulphuric acid, sulphurous acid: nitric acid, nitrous acid.* When we burn a match, we obtain *sulphurous acid,* and sulphuric acid is the liquid substance usually called oil of vitriol. If the body formed by the combination of oxygen with another simple body does not possess the properties indicated above, it is called an *oxyde.* Among the

by plants, either through their roots, stems, or leaves This last gas, that never enters into the composition of the air in a greater degree than a hundredth part, performs an important part in the act of vegetable nutrition, on account of the carbon that it contains. This body is found, in large quantities, in plants submitted to decomposition or combustion.

35. Carbonic acid, formed of carbon and oxygen, is decomposed, according to some naturalists, in the inner bark; the carbon becomes fixed in the plants, and the oxygen escapes. This decomposition, however, can not take place unless the plant is submitted to the influence of light; in the contrary case, the carbonic acid is expelled by the stems and the leaves, just as they received it.

36. Thus we are taught that it would be highly imprudent to sleep in an apartment containing many plants. The air, vitiated by the great quantity of carbonic acid discharged by the plants, might become exceedingly dangerous to the sleeper.

oxydes, there are some that restore the blue color that has been reddened by the action of acids. Their names differ, according to their degree of oxygenation; thus we say, protoxyde, deutoxyde, peroxyde of iron, agreeably to the degree of oxygenation of the metal.

Salts are formed by the union of acids and oxydes; and they derive their names from their constituent parts. If the termination of the acid is in *ic*, it is changed into *ate* — if in *ous*, into *ite*. The name of the acid thus modified is followed by the name of the simple body that enters the oxyde to form that of the salt; thus we will say, carbonate of lime, or carbonate of iron, agreeably as the carbonic acid shall have united itself with lime or iron to constitute the salt — sulphate of lime, or sulphite of lime, as we may have employed sulphuric or sulphurous acid to form the combination.

QUESTIONS.

1. What is the stem?
2. What is the trunk?
3. What is stubble?
4. What is a ligneous stem?
5. What is an herbaceous stem?

6. Of what parts is the stem formed?
7. What are the leaves?
8. What is the footstalk?
9. By what means do plants supply themselves with nourishment?
10. Why does carbonic acid play a great part in the act of nutrition?
11. Where is it decomposed?
12. That this decomposition shall take place, what is necessary?
13. Why should we avoid sleeping in an apartment filled with plants?

LESSON VI.

THE ORGANS OF REPRODUCTION.

37. Those are called organs of reproduction, by which a plant reproduces others of its kind. The most essential are the *stamens*, or male organs; and the *pistils*, or female organs.

38. The pistil, which is usually found in the centre of the flower, is fecundated by a species of dust, called *pollen*, which escapes from the stamens at the moment of blooming. These essential organs of reproduction are detected in almost any flower; the pistils are in the middle, surrounded by the stamens. When these last alone exist in a plant, it never produces seeds; and so the result would be, were we to suppress the upper part of the pistil, which is destined to receive the fecundating powder.

39. The lower part of the pistil is called *ovule*, or *germ*. It is the germ which, in consequence of fecundation, yields the fruit. This last is nothing more in botany than a fecundated germ, or ovule, arrived at maturity.

40. There are some plants whose flowers contain both the pistil and the stamens; these are called *hermaphrodites*. In other plants the pistil is found on one flower, and the stamens on another, but upon different stems. This occurs sometimes, however, upon the same stem. Thus with the oak: flowers with the pistil grow upon one

branch, and those with stamens on another; but with hemp, for instance, these reproductive organs are upon different stalks. When the two organs are found upon the same stalk, though in different flowers, they are called *monœcia* (one-housed plants); when upon separate and distinct stalks, *diœcia* (two-housed plants).

41. When plants of the same family are cultivated in the vicinity of each other, it frequently happens that their produce differs from the parent plant, because it partakes of the nature of both. This is particularly the case with the cabbage family. We then say that *hybridation* has taken place. Hybrid plants, in the vegetable kingdom, are what mules are in the animal kingdom.

QUESTIONS.

1. What is meant by organs of reproduction?
2. Which are the most essential?
3. What is a pistil?
4. Where are the stamens?
5. What is the pollen?
6. What is the germ, or ovule?
7. What is the fruit?
8. What plants are called hermaphrodites?
9. What monœcia?
10. Plants called diœcia, what are they?
11. What is the meaning of hybridation?

LESSON VII.

FRUIT.

42. A FRUIT is divided into two parts: 1. The *pericarp*. 2. The *seed*.

43. The pericarp is that part which, in a pear or an apple, is destined to be eaten. In the interior of the pericarp exists a cavity, lined with a thin membrane. It is in

this cavity that the seeds are found, which in the fruits above mentioned are called *pips.*

44. If we examine the seed well, we will find that it is composed of a pellicle enclosing another part, called the *almond.* It is within this almond that we find the embryo, containing the germ of the new plant.

45. When the seed is placed in circumstances favorable to its development, it germinates, and gives birth to the *radicle*, that plunges into the earth to form the root, and the *plumicle*, that grows upward to form the stem.

46. The first leaves that appear, after germination, are called *cotyledons;* and if a plant has but one of these leaves, it is called a *monocotyledon:* if it has several, it is called a *dicotyledon.* Plants that spring up without leaves, are called *acotyledons.*

QUESTIONS.

1. Into how many parts is the fruit divided?
2. What is the pericarp?
3. Where is the seed found?
4. What is the seed composed of?
5. What is the embryo?
6. What is the radicle?
7. What is the plumicle?
8. What are cotyledons?
9. What a monocotyledon?
10. What a dicotyledon?
11. What are acotyledons?

LESSON VIII.

GERMINATION.

47. When a seed is put in the ground, the moisture causes it to swell; the pellicle that surrounds it is weakened, and the embryo bursts through. Vegetation then

proceeds in two opposite directions, forming the radicle below, and the plumicle above.

48. Germination, then, is the act by which a seed, placed in the soil under favorable circumstances, develops itself, in order to give birth to a plant of the same kind as that whence it sprang.

49. That a seed may develop itself, and form a vegetable, it is not only necessary that it should be placed in the soil, and that the soil should contain the *humus* and mineral substances* required for the nutrition of the plant, but there must also be a concurrence of certain atmospheric influences, that perform an important part in the phenomena of vegetation. These atmospheric influences, or agents, are heat, moisture, air, and light.

50. The success of germination and vegetation depends upon a union of heat and moisture. Those spots always exhibit the finest vegetation in which we find these two agents united. If, on the contrary, one of them should preponderate for a sufficient time, the plant would suffer, and finally perish. It is to establish the relation between heat and moisture, that we water plants in dry seasons. It is a common practice to soak seeds before sowing or planting them, to hasten their germination; but the utility of this practice is more than doubtful; for at the moment of sowing one thing or the other occurs — either the soil is sufficiently moist, or it is too dry. In the first case, steeping the seed would be useless; in the other, vegetation would suffer, after germination, for the want of moisture.

51. Air is also indispensable to germination, on account of the combination of the oxygen which it contains with the superabundant carbon enclosed in the seed. It is

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* When vegetables or animals die, they are decomposed, and their forms changed. The product of this decomposition is called *humus*. Thus, all manures put in the soil become humus.

equally useful to plants; for without it they could not grow. Air, however, is not always favorable to vegetation: if stagnant, it is fatal; if too brisk (as is sometimes the case on high hills), it is injurious, as it causes the plant to transpire too freely, without yielding it anything in return. Air, by its weight, acts as well upon vegetable as upon animal economy. By its pressure upon the pores, it prevents the escape of the sap and blood from the vessels in which they are enclosed. Plants perspire most during the continued prevalence of dry winds. On the approach of a storm or gust, the air is particularly favorable to the development of plants; for then it is warm, and holds suspended a vast quantity of vapors. The vicinity of cities, and generally of those places where much gas is generated by the decomposition of organic bodies, is stimulating to vegetation.

52. Without light, germination can take place, but vegetation can not; or at most it will be very feeble, and the plant will soon perish. The flavor and color of fruits are due to the influence of light upon the plants producing them. A plant deprived of light will be pale and of little consistence. So, when we heap earth upon celery-plants, the object is to deprive them of light, that they may bleach. The outside leaves of a drumhead cabbage are green; but the inner leaves, that are deprived of light, are white.

QUESTIONS.

1. How does germination take place?
2. What is germination?
3. Is the soil alone all that is necessary to the germination of plants?
4. What is humus?
5. Besides the soil, what other agents are necessary to the development of plants?
6. What is necessary to make the germination and vegetation perfect?
7. Why is air indispensable to plants?
8. Is the air always favorable to vegetation?
9. When and where does air stimulate vegetation?
10. Is light necessary to plants?

MORAL REFLECTIONS.

We have seen, in the lessons of the second chapter, the different parts of which a plant is composed — the root, stem, leaves, fruit, etc. If we consider the organization of plants, the structure of their parts, their astonishing variety, from the most humble herb to the majestic tree; if we consider their utility, and the benefits they confer upon man and the whole animal race, we will discover everywhere the most marvellous order, and the hand of Infinite Wisdom. We behold a seed planted in the earth, put forth roots, a stem bearing buds, branches, leaves, flowers, and fruits, in which are enveloped the germs of new plants. If, of all the wondrous works of the Creator, we were to see but this, it would be sufficient to convince us of his power and his infinite bounty. It is for us, and as it were without our concurrence, that nature, or rather a beneficent God, acts upon this earth. It is for man that the fields, gardens, and forests, abound in blessings that would be lost did he not make use of them. Let us not be insensible to so much kindness; but let us render thanks to Him who bestows so much and such constant care on our existence, and who watches over our welfare with such sleepless solicitude.

CHAPTER III.

The Reproduction of Vegetables.

LESSON IX.

REPRODUCTION BY GENERATION.

53. PLANTS are reproduced by their seeds, stems, limbs, and even leaves (as is the case with the cactus). A majority, however, of cultivated vegetables spring from the seeds. It is by this mode of reproduction that we preserve, in most plants, their vigor, strength, and fructuous powers; for it is well known that many vegetables, propagated for several generations by means of their branches, become finally barren.

54. When a plant is perpetuated by means of its seeds, as is the case with wheat, rye, etc., we call it *reproduction by generation;* and we say that the reproduction is by *propagation*, when it is any other part of the vegetable than the seed that concurs in the formation of the new plant. Thus, it is by propagation that the limb or cutting of a tree produces another tree.

55. In the reproduction by generation, we must above all things be careful in the selection and preservation of the seed. That they may unite all the qualities requisite to reproduction, it is indispensably necessary that they should be thoroughly ripe, and well preserved. We should above all things prevent their getting heated, in which case they would either not sprout at all, or produce but feeble plants. A common mode of testing the quality of seeds, is to throw them into water; those floating upon the surface being considered worthless. But another, a better

method, and a more certain test of the germinating faculty is to place the seeds in a saucer, between two pieces of cloth saturated with water. After a time equal to that which seeds usually require to sprout in the earth, we may judge of the quality of those under trial.

56. Some seeds retain the germinating faculty a long time; but it is considered safer, particularly in field culture, to use fresh seeds. It has been remarked that fruit accruing from old seeds, that had retained their germinating power, are better than those furnished by new seeds; these last producing more vigorous stems and leaves. Most plants come well from the seed; some trees only thrive best from another method of reproduction.

57. It is often advantageous to set apart certain rich spots of ground as nurseries, or plant-beds, in which the seed is sown. After the plants attain the proper size, they are transplanted to where they are to remain permanently. This is the method pursued with tobacco, cabbages, etc.

QUESTIONS.

1. In how many ways are plants reproduced?
2. What is reproduction by generation?
3. What is reproduction by propagation?
4. What should be particularly attended to in reproduction by generation?
5. What are the requisites of good seed?
6. How can seeds be tested?
7. What are the results obtained from old and new seeds
8. What is a nursery, or plant-bed?

LESSON X.

REPRODUCTION BY PROPAGATION—LAYERING

58. THERE are four principal modes of reproduction by propagation, namely: 1. Layering. 2. By cuttings. 3. By grafting. 4. By inoculation.

59. Layering consists in bending down the branches, limbs, or suckers, without separating them from the parent plant, and covering them with soil; their extreme ends only being left out. Thus buried, they will generally soon strike root; some particular trees, however, with extreme difficulty. Such must be tongued — an operation which consists in cutting the layer half off, and splitting it up an inch or more; the cleft to be kept open by a small wedge, and buried beneath the surface. This operation should be performed in spring; and the plant, when well rooted, may be separated in the autumn or spring following.

60. By cuttings. There are many plants that may be raised from cuttings. For trees, cuttings should generally be from eight inches to a foot in length, cut off at the bottom, close below an eye, and planted in a humid soil, two thirds of their length beneath the surface, and the ground trodden hard. With some particular kinds, however, it is necessary to square the bottom of the cutting, and press it hard down on the bottom of a pot. Other kinds must be planted in pure sand, and protected from the sun till rooted. They require artificial heat in the soil, and a confined atmosphere, which moderates their transpiration.

QUESTIONS.

1. How many modes are there of reproduction by propagation?
2. What are layers?
3. When a layer takes with difficulty, what is done?
4. When should layers be made, and when cut off?
5. How should cuttings be prepared and planted?
6. What is the treatment of those cuttings that do not take readily?

LESSON XI.

MULTIPLICATION OF PLANTS BY GRAFTING.

61. GRAFTING consists in placing a branch or twig of one vegetable upon another, in a way to cause the branch or twig to produce a new plant, with more valuable products.

62. The plant grafted upon is called the *stock;* the plant grafted, the *scion.* Grafting is particularly useful to perpetuate certain vegetables, that are by nature endowed with peculiar properties, that would be lost were the plant continued by means of the seed.

63. Professor Thouin has described forty modes of grafting: we will describe here three — *cleft-grafting*, *grafting by approach*, and *root-grafting.*

64. *Cleft-Grafting.*—This mode of grafting is usually practised on stocks of from one to two inches in diameter. It is thus performed: The head of the stock is carefully sawed or cut off, at a part free from knots, and the top pared smooth. With a thin knife, split down the stock through the centre, to the depth of about two inches; insert a wedge to keep it open for the reception of the scion. The scion is to be prepared in the form of a wedge, with an eye, if possible, in the upper part of the portion thus formed. Perfect success is the more certain when this is the case. The scion is now carefully inserted, so that the inner bark of the scion and the inner bark of the stock may both exactly meet. In large stocks, sometimes four scions are inserted. The whole is now to be carefully covered with the grafting clay, except two or three eyes of each scion.

65. *Grafting by Approach.*—This is often resorted to with plants that succeed with difficulty by other modes. The limb or limbs of each plant, which are to be thus

united, must be prepared with a long, sloping cut, of several inches, nearly to the centre; and the part of each plant thus prepared are to be brought together and firmly secured by a bandage, so that the bark shall exactly meet on at least one side; they are then covered, at the junction, with clay or composition. When a complete union has taken place, the trees are separated with a knife, by cutting off the scion *below* the junction, and cutting off the stock *above*.

66. *Root-Grafting.*—This operation is often performed on grape-vines, just below the surface of the earth, by the usual mode of cleft-grafting. It is also performed on portions or pieces of root, where suitable stocks are scarce.

QUESTIONS.

1. What is meant by grafting?
2. How is the plant grafted upon called?
3. What is the scion?
4. Why is grafting particularly useful?
5. How many modes of grafting are there?
6. Describe cleft-grafting.
7. How is grafting by approach performed?
8. Describe root-grafting.

LESSON XII.

INOCULATING.

67. INOCULATING is the operation of transferring any desirable variety of tree upon the stock of an inferior variety. The operation is principally practised on small trees, and only during the time when the sap flows freely, and chiefly during the months of August and September.

68. Select for the buds the ripest young twigs of the year, and cut off the leaves, leaving the footstalk entire Having selected a smooth place in the stock, make a per

pendicular slit downward, quite through the bark, an incn or a little more in length. Make a cross cut at the top o this slit, quite through to the wood, a little slanting downward. Next raise the bark on each side of the slit, from top to bottom, taking care not to injure the sap-wood. Proceed then quickly to take off a bud. This is done by entering the knife about half an inch below the bud, quite through the bark, and separating the bark from the wood, to the same distance above the eye; always leaving a very thin slip of wood, about one third the length of the bud. This thin slip of wood occupies the middle section of its length. The bud is to be immediately inserted in the stock to the bottom of the slit, and between the bark and the wood; the top of the bud being squared even with the cross cut, every part, except the eye, is firmly bound, and covered with baize matting.

69. When the season is far advanced, and the sap flows less freely, it is best to take out the whole of the wood, leaving always the root of the bud. The string is usually taken off in about ten days. In the succeeding spring, when the frost is out of the ground, and the buds begin to swell, cut off the stock, about a quarter of an inch above the bud, sloping downward on the opposite side.

QUESTIONS.

1. What is inoculation?
2. On what is it usually practised, and when?
3. How is the operation performed?
4. When is it best to take all the wood from the bud?
5. When is the string to be taken off?
6. When and how is the stock to be cut off?

PART SECOND.

CHAPTER I.

LESSON I.

GENERAL CONSIDERATIONS OF THE SOIL, AND THE CAUSES THAT AFFECT ITS VALUE.

1. THAT portion of the earth turned up by the plough, and in which plants are developed, is called the *soil.*

2. That portion of the earth which is not cultivated, and which lies immediately beneath the soil, is called the *sub-soil.* In certain cases, it is advantageous to bring a portion of the sub-soil to the surface, which is effected by deeper ploughing or digging than usual; the depth of the soil is increased, and by this means better crops are obtained. We will see presently, however, that there are circumstances in which the soil would not be at all benefited by this course.

3. The soil is formed of two kinds of principles: some are of vegetable and animal origin, the others are of mineral origin. These last form the earth properly so called, and constitute the activity of the soil; the first its richness.

4. That a soil may yield abundant crops, it is necessary that its activity should be in proportion to its richness; but it is generally the first quality that predominates, in which case the yield is but little.

5. From what precedes, we must see that almost all soils must differ in value; for it is rare to find two precisely alike as regards composition. In some (and it is

the smallest number), the richness (organic remains) is in excess, though in very variable proportions. In others there is an excess of mineralogical principles. In either case the cultivator is the loser; for in the first soils, most crops would lodge,* and on the second the vegetation would be thin and meager.

6. We must not conclude that the nature of the soil and the proportion of its constituent elements alone influence its value. Without doubt, these causes contribute much; but there are many other circumstances, such as the exposure and depth of the soil, and the nature of the sub-soil, that in a greater or less degree affect the value of land. Thus, a lot in which the soil is not more than four inches deep, is not near so valuable as one in which it is a foot deep, though the soil is precisely alike in each. The value of land may also be affected by the nature of the sub-soil, for if it be impervious to water, the plants may suffer from too much wet; if too porous, they may suffer in seasons of drought; and finally the sub-soil may contain mineral principles inimical to vegetation.

7. It results from what we have just said, that the classification of soils can not depend upon the relative proportions of the elements of which they are constituted, notwithstanding the contrary opinion, emitted by some eminent writers. It is only by the cultivation of a farm, by a close examination of its condition in all seasons, wet and dry, and by the consideration of other circumstances that we shall indicate hereafter, that we can form an estimate approximating its real value.

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* When the growth of grain is too highly stimulated by manure, or any other agent, the stems do not acquire sufficient consistence or strength to maintain an erect position; they fall down, and this is called *lodging*.

QUESTIONS.

1. What is the soil?
2. What is the sub-soil?
3. May the depth of the soil be increased?
4. Into how many classes do we divide the constituents of the soil?
5. That a soil may be fertile, what is necessary?
6. What is the defect in too rich a soil?
7. How is the vegetation in a poor soil?
8. What are the qualities to the value of a soil?
9. Can a soil be classed according to the relative proportion of its constituent parts?
10. Which is the best way to determine the value of a farm?

LESSON II.

THE MINERAL PARTS OF THE SOIL.

8. As we have before said, the soil is composed of some substances of mineral and others of vegetable and animal origin. These last accrue from the organic remains of the vegetable and animal kingdoms, and are decomposed upon and under the surface of the earth, or have been thrown upon the fields by the cultivator. That they may produce a proper effect, it is necessary that they should be mixed with mineral substances; for alone they would be injurious to plants, as they would render vegetation too active.

9. Among the mineral substances that enter into the composition of soils, and those that are the most frequently found, and in the greatest quantity, are, *silex*, or *silicious sand; alumine;* and the *carbonate of lime.*[*]

10. The other bodies that also enter into the composition of the soil, but less frequently and in less quantity, are, sulphate of lime,[†] or plaster; carbonate of magnesia;

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[*] Carbonate of lime is formed by the union of carbonic acid with oxyde of calcium, or with lime. All bodies thus formed by the union of an acid and an oxyde, take, as we have said before, the name of a salt.

[†] A salt formed by the union of sulphuric acid and lime.

oxyde of iron; and oxyde of manganese. These last two are the only mineral parts that give color to the soil.

11. If the whole of the soil was formed of one of these elements, it would be completely barren; it could only be rendered fit for cultivation by mixing with it a sufficient quantity of earth.

12. Soils that contain much silex are called light, or sandy; those, on the contrary, that contain much clay,* are called strong, stiff, or clayey.

13. A clayey is much more compact and tenacious than a sandy soil. It is almost always very difficult to work; whereas a light soil is easily worked, at all times.

14. The different soils, then, may be divided into three classes, as regards their tenacity, or the difficulty of working them, and their fitness for one vegetable rather than another: 1. Silicious, or light land. 2. Loamy land, or that which is brought to a medium consistence, either by amendments, by manures, or even by cultivation. 3. Stiff, or clayey lands. There are, however, several other divisions admitted, depending upon the nature and quantity of the constituent elements of the soil. Thus those are called calcareous soils, which contain carbonate of lime; peaty soils are those which contain peat; ferruginous or ocherous soils, those which contain iron or ochre; and finally those are called alluvions, that are formed by the deposites of streams and rivers, — and these are usually the best for cultivation.

15. If it is useful to be thoroughly acquainted with the properties of the constituent elements of a soil, it is less with a view to appreciate the value of the land, than to ascertain what amelioratorsꝉ should be employed in its improvement.

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* Clay is a combination of alumine and silex.

ꝉ We designate as *ameliorators* those substances which, placed in the soil, change its nature, by rendering it more friable, or more compact. Thus,

QUESTIONS.

1. Whence come the organic substances found in the soil?
2. What mineral elements are found in the earth in the greatest quantity?
3. Which are those more rarely found?
4. In which case is the soil entirely barren?
5. What is a light soil?
6. What is a stiff soil?
7. Which are the most difficult lands to cultivate?
8. Into how many classes may soils be divided?
9. What is understood by calcareous soils?
10. What by loamy land?
11. Which is the best to cultivate?
12. Why is it particularly useful to be familiar with the properties of the constituents of a soil?

LESSON III.

SILEX, OR SILICA.

16. Silex, or silicious sand, is composed of two elements — oxygen, and a metal called silicium. This metal is found in the common flint, in almost a pure state. It is not soluble in water, and can only be decomposed by fluoric, or phosphoric acid. An earth is recognised to be silicious when, mixed with water, it will not work into a paste.

17. Silica is very generally diffused throughout the earth. It is met with, in greater or less quantities, in almost all soils; and when not in excess, so far from being injurious, it is beneficial to the soil, by rendering it lighter, easier to work, and more favorable to vegetation.

18. But when sand predominates in a soil, it communicates defects that diminish its value. Crops upon it are exposed to suffer from drought, because silica does not

lime is an ameliorator, by the property which it possesses of rendering stiff lands of easier cultivation, and giving more compactness to lands that are too light.

combine with water; and the least heat causes it to lose the little moisture that it might possess.

19. Sandy lands do not easily combine with manures, the soluble parts of which are either carried off by rains, or filtrate through the sub-soil. This renders it necessary to put on weak manures, and renew them frequently.

20. Sandy lands, being very friable, do not require much work; for we would thereby increase a porosity already too great, and render the roots of the plants cultivated in them liable to exposure. To avoid this difficulty, these lands are often left in pasture for several years; sometimes they are rolled, after being sown, to render them more compact; or sheep are penned upon them. In the latter case, the soil is improved in two ways; by the tramping of the sheep, and by their droppings. Sandy lands possess the advantage of clayey lands, in being at all times in a condition to work without injury.

21. Sandy and gravelly soils differ in value, agreeably to the state of the silica, and the proportion in which it is combined with other elements. When they are composed of coarse sand and pure gravel, they are of little or no value; for they will yield but poor crops, even with a great outlay in manure. Some writers have advised these lands to be converted into meadow; but this can only be done (if then at a profit) where they can be easily irrigated; for without the necessary moisture, most of the natural meadow-grasses would speedily perish, in seasons of drought.

22. Of the cereals, rye is almost the only grain that succeeds well in sandy lands; wheat, and even barley, do not thrive on them. But Indian corn, buckwheat, and root crops, with plenty of manure, will do very well. Crops ripen earlier in these soils; but their early maturity is sometimes at the expense of their quality. Root crops grown upon them, if not so heavy, are more nutritious

than those grown upon stiff lands, because they are less watery.

23. Silica is found in the ashes of almost all vegetables, but principally in those of the cereals. This is why it has been supposed that it concurs in the nutrition of plants, although from its nature it does not seem fit for this function. In all cases, its principal function is to act mechanically upon the soil.

QUESTIONS.

1. Of what is silica composed?
2. How is a silicious soil recognised?
3. Is it widely diffused throughout the earth?
4. Is it always injurious to land?
5. To what are crops growing in sandy land exposed?
6. How does it combine with manures?
7. Does sandy land require much work?
8. What is done to prevent the roots from being exposed?
9. Under what circumstances ought sandy lands to be converted into meadows?
10. What cereals can be cultivated on them?
11. What crops thrive best on them?
12. In what bodies is silica found?

LESSON IV.

CLAY.

24. Clay is composed of silica and another body called *alumine*, or *alumina*. This last, when obtained in a pure state, is a powder of a whitish color; it is distinguished by the facility with which it absorbs water.

25. Land in which clay predominates is not everywhere of the same color. It is often of a reddish hue; this is owing to the oxyde of iron it contains. If it contains a large proportion of humus, it becomes black, and loses its color by calcination.

26. Clayey soils have, as their distinguishing character

the adhesiveness of their parts (due to the plastic property of the alumine they contain); and this property alone will enable even the inexperienced to discriminate them. A stiff clay when dried, by either natural or artificial heat, becomes so hard as to resist a considerable mechanical pressure. This property makes it valuable for the manufacture of bricks, tiles, pottery, etc.

27. On account of the tenacity of such soils, they are tilled with more difficulty than the freer soils. They require to fertilize them a larger proportion of manures; but they retain the effects of these manures a longer time. They are better suited to the cultivation of plants with fibrous than with fleshy roots, or tubers.

28. Soils of this class, as of every other, possess many degrees of natural fertility. The poor clays form, for the most part, an unprofitable soil; because, while their powers of production are inconsiderable, the expenses of tilling them are large. The clay soils of this character are generally of little depth, and rest upon a retentive subsoil. The natural herbage they produce is coarse, and not very nutritious; and they are not well suited to the cultivated grasses, and other herbage plants. They are little fitted for the growth of turnips, or other plants with fleshy roots or tubers. Such soils have everywhere local names, which sufficiently denote their qualities; and they are termed, by not an improper figure, *cold soils.*

29. Very different in their value and nature are the richer clays. These bear weighty crops of all the cultivated kinds of small grain; they do not excel the better soils of other classes so greatly in the production of corn and still less in that of barley, in which the lighter loams may surpass them. But they are unequalled in the production of wheat, and in many places derive their descriptive appellation from that circumstance, being termed *wheat* soils. They will yield large returns of the culti

rated grasses and leguminous herbage plants, though they are not so quickly covered with the natural herbage plants of the soil, when laid down to perennial pasturage, as the lighter soils.

30. Clays, like other soils, approach to their most perfect condition as they advance to that state which has been termed loam. The effect of judicious tillage, and of the application of manures, is to improve the texture of such soils, as well as to enrich them. Thus, clays in the neighborhood of cities become dark in their color, and less cohesive in their texture, from the mixture of animal and vegetable matter; and thence acquire the properties of the most valued soils of their class.

QUESTIONS.

1. What is the composition of clay?
2. What is alumine?
3. Why are clay soils sometimes red?
4. What is their distinguishing character?
5. What manufacture is clay valuable for, and why?
6. Are they as easily worked as other soils?
7. What is said about the application of manures to clays?
8. What class of plants succeed best in them?
9. Why are they unprofitable to cultivate?
10. They are unfitted for the growth of what plants?
11. Clay soils are unequalled, when of fine quality, for the production of what?
12. They yield large returns of what?
13. What is the effect of manures and judicious tillage upon their texture?
14. What is the effect of animal and vegetable manures upon their color?

LESSON V.

CARBONATE OF LIME.

31. As we have indicated (No. 9), carbonate of lime is formed by carbonic acid and lime. Carbonic acid is a gas heavier than air; large quantities of it are thrown off by burning charcoal.

32. All earths that contain carbonate of lime are calcareous, and an excess is injurious, as the plants would fire. On the contrary, if the carbonate of lime is in suitable proportion, it is advantageous to the soil, and renders it better for cultivation.

33. Chalk, marble, limestone, shells, are calcareous. When exposed to the action of heat, the carbonic acid escapes, and they are converted into lime. Some of these substances, that become friable from the effects of frost, may improve the soil by increasing its depth.

34. Carbonate of lime is found almost pure in marble, but in other bodies it is often united with foreign substances. It can only be effective in the soil when reduced and pulverized by the action of heat. If it remained in its primitive state of stone, it would be more injurious than beneficial — impeding the plough, breaking implements, occasioning loss of time, and extensive repairs. This applies, however, to large stones only; for if they are very small they improve clay lands, by rendering them less tenacious.

35. We know that lands containing clay in large quantities, are very compact, and difficult to cultivate. Carbonate of lime, reduced to an earthy texture, serves to loosen and render them more permeable to air, and to give them, consequently, properties favorable to vegetation.

36. There are also soils containing organic remains, that decompose with great difficulty, and from which, consequently, cultivated vegetables can derive but little benefit. Thus, with soils that have been a long time in fallow, and are clothed with fern, sedge, rushes, etc., if we content ourselves with merely turning them under, without the application of such substances as lime to favor their decomposition, a long time may elapse before the vegetation, so turned under, will produce the desired effect.

37. Sometimes even the substances contained in a soil

are totally inert and would so remain for centuries, without encouraging vegetation. Carbonate of lime possesses the property of decomposing all these remains, and of rendering them fit to serve the nutrition of plants. It also destroys the acidity of certain soils. We shall, however, have occasion to recur to the effect of mineral manures.

38. Certain plants seem to prefer calcareous to all other soils, as sainfoin and lucerne, both forage plants. The famous vineyards of Champagne are on a soil eminently calcareous.

39. Potatoes, turnips, beets, cabbages, Jerusalem artichokes, grow finely in calcareous soils; as do peas, corn, barley, tobacco, etc.

QUESTIONS.

1. What is the composition of carbonate of lime?
2. What is understood by calcareous earth?
3. What is the effect of too much carbonate of lime?
4. What the effect when it exists in the right proportion?
5. What are the calcareous substances most commonly met with?
6. What occurs when carbonate of lime is exposed to the action of heat?
7. What is the effect of calcareous substances upon the soil when they are rendered friable by frost?
8. In what state must the carbonate of lime be to produce the proper effect?
9. What is the effect of carbonate of lime on clay soils?
10. On soils containing organic remains of difficult decomposition?
11. On acid soils?
12. What plants prefer calcareous soil?

LESSON VI.

PLASTER, MARL, MAGNESIA, IRON.

40. Among the mineral substances that enter into the composition of soils, there are some of more rare occurrence, and in smaller quantity, than silica and clay

These are plaster, marl, magnesia, iron, and manganese.*

41. Plaster, or gypsum,† is of importance not only as a constituent part of certain soils, but also on account of the effect that it produces upon certain plants, to the growth of which it is particularly favorable. It is diffused throughout nature to some extent, and in some localities it is quarried in large quantities. After being pulverized, it is used either in building, or as an agent of vegetation. There is this difference between carbonate and sulphate of lime: when exposed to heat, the first loses its acid ; whereas the second, as it never separates from its sulphuric acid, ever remains in the state of a salt.

42. Marls are found in many soils, and sometimes in such quantities as to make them unfruitful. They are of different colors — white, gray, blue, etc. Their elements are generally clay and carbonate of lime, often mixed with silica, or shells that also contain carbonate of lime. Marl is said to be more or less rich as it contains more or less carbonate of lime.

43. Marls, as we shall see hereafter, are very useful in the amelioration of lands. They are distinguished from other earths by the effervescence produced when they are brought in contact with acids. This property is common to all substances containing calcareous principles.

44. Magnesia, which in a pure state is a white, insoluble substance, is generally found in the soil in the state of a carbonate — that is to say, united with carbonic acid. Some writers pretend that this body, if employed without being calcined, is injurious to vegetation ; but this is not

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* This last, as well as some other earthy bodies, are met with so rarely, and in such inconsiderable quantities, that we will make no further allusion to them.

† Frequently called gypsum : it is composed of sulphuric acid, lime, and water

confirmed by facts. It is probable that carbonate of magnesia acts upon the soil like carbonated lime.

45. Iron is found in the soil in the state of an oxyde; that is to say, united with oxygen. It is sometimes, also, met with as a carbonate. It rarely exists in large quantity in the arable soil; if it existed in proportions rather strong, it would render the last entirely barren.

46. Iron, through its property of coloring soils, causes them to absorb more heat; for it is well known that white substances are not so readily warmed by the solar rays as black ones.

47. Iron is more or less injurious according to the degree of oxydation. When it does not contain the whole of the oxygen with which it is capable of combining, it injures vegetation.

QUESTIONS.

1. What substances besides silica and clay are sometimes to be met with in the soil?
2. Is plaster of importance to agriculture?
3. Is it generally disseminated throughout nature?
4. Of what is marl composed?
5. Which are the richest marls?
6. To what use are they put?
7. How do we detect the presence of calcareous principles in a soil?
8. What is magnesia?
9. In what state is iron found in the soil?
10. Is a ferruginous soil fertile?
11. How can iron render the earth warmer?

LESSON VII.

THE ORGANIC PARTS OF THE SOIL.

48. THAT a soil should be productive, it is not alone sufficient that it should contain, in suitable proportions, the mineral substances that we have studied in the pre-

ceding lessons; but it must also, united with the mineralogical elements, contain elements of organic origin; for these last play a very active part in vegetation.

49. If we examine closely what passes in nature, we will perceive that all organized bodies are continually changing in shape, until finally, the vital principle ceasing to exist in them, they perish and decompose. It is these decomposed bodies that we put on the land to satisfy the wants of plants, which, after having served as food to man and animals, become the source of a new vegetation.

50. This alternate and continual change has caused it to be said that vegetation is the source of reproduction, and in truth: "No plants, no animals; no animals, no manure; no manure, no cultivation." As we perceive, bodies are not annihilated; they are only continually assuming different forms. The earth may be considered as a mediator between life and death, as it receives from disorganized vegetables elements that it gives back to a new organic life.

51. A soil is the richer, and consequently the more productive, as it contains more organic remains. On the other hand, as we have some crops that are more exacting than others as regards the quantity of nutritive elements that they require, it follows, that the farmer should take the least exhausting crops from the least fertile land; for in rational agriculture we can never exact from a soil more than we give it, or more than its nature permits it to furnish.

52. The soil is not always exhausted by the crops that it yields; for such crops leave remains that decompose in the soil. These remains are the leaves, stems, and roots of the plant. The more numerous they are, the less is the soil injured; and it may be (as with clover), that it has lost none of its value; so that, to obtain other products, it is not necessary to add to the organic remains already within it. But the farmer ought, in this case, to be

thoroughly acquainted with the exhausting power of the plants that he cultivates, so as not to exact from the land more than it can yield. We shall return to this subject hereafter.

53. All organic bodies are not composed alike, nor are they of equal value as manures. They may be derived from vegetables or animals. Those of vegetable origin are formed for the most part of oxygen, hydrogen, and carbon.* There are a few vegetables, such as the cabbage and rape, that contain azote.† Animal remains, on the contrary, all contain azote, united to the three other bodies; and for this reason they are more nourishing, more active, but less durable, than vegetable substances, because they are decomposed more rapidly.

54. All organized bodies are not decomposed with equal rapidity. In the vegetable, as in the animal kingdom, there are some that remain a long time in the soil, without producing the least effect. Different means are employed to render them suitable to the wants of vegetation, as we shall see in the following lesson, treating of humus.

QUESTIONS.

1. What must be done to make a soil productive?
2. Do organic bodies always retain the same form?
3. Is vegetation the source of reproduction?
4. What is it that renders the soil rich and productive?
5. What vegetables ought to be cultivated upon a poor soil?
6. What are the remains that certain vegetables leave in the soil?
7. Do all plants exhaust the soil?
8. Are all organized bodies formed of the same elements?
9. Of what elements are vegetables formed?
10. What elements form animals?
11. Do all organic remains decompose with equal rapidity?

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* Hydrogen and carbon are two bodies very generally disseminated throughout nature. Hydrogen united with oxygen forms water. Carbon is nothing more than pure charcoal. Plants assimilate to themselves a greater quantity of this substance than of any other.

† Azote is a body which, united with oxygen, forms the air that we breathe

LESSON VIII.

THE FORMATION OF HUMUS, AND ITS PROPERTIES.

55. Humus results from the decomposition of organic bodies (see No. 8). The proportion and nature of its constituent elements are not always the same; for in some cases animal, in others vegetable parts predominate.

56. Straw, and the excrements of cattle, are destined to be transformed into humus. As this substance is of an earthy texture, gardeners give it the name of *mould.* This last denomination, however, has also been given to the manure derived from the cleaning of ditches and the sweepings of streets, that have been exposed for a time, in heaps, to the action of the atmosphere.

57. Among the bodies forming humus, some are decomposed in the open air, others in the bosom of the earth, and others in wet and marshy places, according to the circumstances in which they may have happened to be placed. In the latter case, *turf* is often formed. This proceeds from the decomposition of vegetables that have grown successively, for a long time, upon the remains of plants similar to themselves.

58. Turf, or peaty lands, are recognised by their elasticity, their porosity,* and their blackish color. Turf is employed as fuel, and as manure. Turf formed under the water is devoid of any acid principle; but that on the surface of the soil is often acid.

59. The properties of humus vary according to the

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* Elasticity and porosity are properties possessed by all bodies in a greater or less degree. When a body submitted to pressure bends out, and resumes its first shape after the pressure is taken off, it is said to be elastic. A sponge, for instance, is elastic. Porosity is a property possessed by bodies of being filled with holes, of a greater or less size, and more or less numerous. Thus, the human skin is very porous, as a square inch of it is pierced with many thousand holes.

bodies that it is derived from. That from fecal matters (poudrette) is more active than that derived from the excrements of animals. It is pretended that humus accruing from horses and birds produces a better effect on the soil than that from cattle. It is admitted that the excrements of pigeons and poultry are much more active, in similar quantities, than manures derived from other animals. We should not, however, as we shall see hereafter, attach too much importance to these distinctions in the value of the manures in more general use.

60. Matters derived from animals, entering easily into putrefaction, furnish a humus of better quality than that proceeding from vegetable matter; for these are often decomposed with great difficulty.

61. Humus is sometimes acid, particularly in low and wet places, such as turf is formed in. When it has this property, it is injurious to vegetation. In this case, to render it fit food for plants, calcareous substances, such as lime, are put in the soil; and they are in this instance a very efficient remedy. Moreover, in lands that contain carbonate of lime, sour humus is never found. Animal black may be substituted for carbonate of lime; it is a substance derived from the calcination of bones.

62. *Paring and burning*, also, destroy the acidity of the soil. It consists in paring off the crust of the earth, some two or three inches deep, burning it in small hillocks, and in scattering the ashes. This operation has also the advantage of destroying noxious weeds and insects.

QUESTIONS.

1. What is humus?
2. Is it always composed of the same elements?
3. By what other name is it called?
4. Where are the bodies decomposed that form humus
5. Where is turf found?
6. By what are turf lands recognised?
7. What use is made of turf?

8. In what circumstances is turf sour?
9. What distinction is drawn in the value of humus?
10. Which is the best humus, that derived from animal or that from vegetable matters?
11. In which case is humus sour?
12. What means are employed to correct the acidity in humus?
13. In what does paring and burning consist?
14. What other advantage does this mode possess?

LESSON IX.

OF THE ACTION OF HUMUS IN THE SOIL.

63. Organic remains that are decomposed in the soil produce two different effects: 1. They furnish the plants with a part of their nutritive principles. 2. They act upon the physical properties of the soil.

64. The properties of the soil are divided into two classes. Those that relate to its composition take the name of chemical properties; and those that concern its texture, its position, etc., are called physical properties.

65. The action of humus, as food for plants, has been very much discussed by modern writers. Some contend that humus, by means of the carbon that it contains, furnishes the roots with the greater part of the elements necessary to the vegetation of the plant; and that a feeble portion only of these elements is derived from the atmosphere. Others, on the contrary, have maintained that the atmosphere supplies the greater part of the nutritive elements, because the hydrogen, oxygen, and carbon, that enter into the composition of all vegetables, are furnished by air and water, and are consequently derived from the atmosphere.

66. This last opinion is in truth supported by some facts Thus, we have some very productive lands containing very little humus. Some vegetables, supplied with water only,

and exposed to the influence of the air, have attained a fine development. But these are altogether exceptional cases; and it must always be admitted as a general rule, that a soil yields fine crops only when it contains a supply of humus in proportion to the wants of the plants. Moreover, that a vegetable should be able to derive its food from the atmosphere, it must already have grown out of the earth; and it must consequently have received from the soil sufficient strength to perform this act.

67. It is known that a good deal of carbon enters into the composition of all plants; but they do not absorb this substance in the state in which it is found in their organization. It can only be absorbed by the roots and leaves in the form of gas, and united with oxygen that is in the state of carbonic acid. Plants exposed to the influence of the sun lose their oxygen, and the carbon combines with the other elements to furnish that infinite variety of products that vegetation displays.

68. As to the physical properties of humus, it loosens the compact, and give consistency to light soils. By its color it imparts coolness to a dry soil, and can in other cases give warmth to the land. It renders stiff soils permeable to air and other atmospheric influences, and permits the roots of plants to penetrate the arable surface with greater ease.

69. In light land that is hot and burning, humus is decomposed with great rapidity, so that it requires but a slight quantity to produce an immediate effect; but in return these soils are soon exhausted. Calcareous soils also decompose humus with great facility, and for this reason such lands should be manured with substances of difficult decomposition; for in a stiff soil they would remain inert for very many years.

QUESTIONS.

1. In how many ways does humus act upon the soil?
2. How are the properties of the soil divided?
3. What are the different opinions on the action of humus in the act of vegetation?
4. Are there facts that sustain one or the other of these opinions?
5. Can these facts establish a general rule?
6. In what state is carbon found when absorbed by plants?
7. What is the action of humus on the physical properties of soil?
8. In what soils is humus most readily decomposed?
9. What substances ought in preference to be placed in calcareous soils
10. What would they do in stiff soils?

CHAPTER II.

The Physical Properties of Soil.

LESSON X.

TEXTURE AND DEPTH OF THE SOIL.

70. The nature and the proportion of the elements that compose a soil are not the only causes that influence its quality or degree of fertility. The physical properties (see No. 65) exert also an influence that it is very important that the farmer should know. There may be a considerable difference in the value of two fields, even when they are composed of elements of the same nature, and are in the same neighborhood. This difference is due to several causes, that we will now examine.

71. The first thing that a farmer should attend to, who wishes to lease or rent a farm, is the texture and depth of the soil. These are two properties that should have the greatest influence, not only upon his choice of rotations,* but upon the cost of cultivation. Of two farms of equal extent, one may cost twice as much to cultivate as the other. We may easily conceive, then, how important it is that the farmer should possess a thorough knowledge of the properties to which we allude.

72. The texture or consistency of a soil is nothing more than the degree of strength with which its molecules are bound to each other ; this is what is called cohesion. The more consistent a soil is, the harder it is to work, and the

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* A system of rotation is that by which, on a given piece of land, one crop is made systematically to follow another.

more impenetrable to the roots of plants. A medium consistency agrees best with vegetation. This may be obtained by hauling upon the land a quantity of humus; but as this method would be too costly, particular substances are made use of (that we shall describe hereafter), called ameliorators (mineral manures).

73. If too close a texture is injurious to vegetation, too loose a one is not less so, and very sandy land is of little or no value. In a blowing sand, plants can not take the fixity that they require, and are forced to fall.

74. All soils are not of equal depth; they vary from half an inch to many feet.

75. Deep soils possess over others important advantages. They retain moisture better in seasons of drought, without becoming too wet in rainy weather. When equally rich, they furnish plants with a greater mass of food than other soils. Long-rooted plants, such as lucerne, and tap-rooted plants,* such as beets, parsnips, carrots, etc., thrive best in soils of great depth.

QUESTIONS.

1. Are the physical properties of the soil of any consequence to the cultivator?
2. What ought first to be looked to by a farmer wishing to lease or purchase a farm?
3. Why should we seek to know the texture and depth of a soil?
4. What is meant by the consistence of a soil?
5. What are the defects of too much closeness?
6. What is the best consistence?
7. Will humus bring it about?
8. What are the inconveniences of sandy soils?
9. Are all soils of the same depth?
10. What advantages do deep soils possess over others?
11. Which are the plants that thrive best in a deep soil?

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* Tap-roots are those that descend perpendicularly, to a certain depth, in the soil.

LESSON XI.

SITUATION OF THE SURFACE.

76. WHETHER the surface of a farm lies well or not, depends upon the nature of the soil. Thus, sandy land rarely suffers from being level, as it seldom retains too much moisture. Clayey lands, on the other hand, being naturally disposed to moisture, would evidently suffer from continued rains, if so situated. The water not being able to penetrate through the earth, would remain upon the surface, and injure and sometimes kill the plants.

77. Arable lands lie best when just sufficiently rolling to carry off the surplus water, with the assistance of the water-furrows that should always be made immediately after seeding. Water-furrows are of great importance, and farmers are frequently great losers by neglecting to make them; for wheat covered by water, in freezing weather, often suffers, and is frequently killed.

78. In some cases, water-furrows do not remedy the evil of too much moisture. Recourse is then had to ditching, or what is better, under-draining, which is done by digging narrow ditches, filling them half full with broken stone or brush, and then throwing the earth back into them. The water, when the operation is properly performed, will flow freely among the stones or brush, at the bottom of the ditch.

79. Some farmers have even changed the nature of the subsoil, by replacing it with stone and gravel; but this process is enormously expensive, and only applicable on a very small scale.

80. Hilly lands possess some advantages over those that are level; among others, the better exposition of the plants to light and air.

81. But these advantages are overbalanced by serious

drawbacks; heavy rains carry off the soil and manures; the ploughing is more difficult, and the hauling heavier.

QUESTIONS

1. What indicates the best situation that a soil should be in?
2. May sandy lands be level?
3. Is it as well that clay lands should be level?
4. How do clay lands lie best?
5. What precautions should the farmer take to preserve his lands from too much moisture?
6. When should we under-drain?
7. What other means can be employed to carry off the water?
8. What advantages do hilly lands possess?
9. What are the objections to these lands?

LESSON XII.

SUB-SOIL.

82. The elements of the sub-soil are sometimes of the same nature as those that compose the surface; but they have not the same properties, for they are deprived of contact with the air, and are rarely found mixed with mould. In other cases, the mineralogical elements of the sub-soil are of a nature entirely different from those on the surface.

83. We may in general distinguish three species of sub-soil; the clayey, the sandy or gravelly, and the calcareous. Depending upon the nature of the soil, each of these sub-soils, as we shall see, endows it with properties more or less favorable.

84. A clayey sub-soil, beneath a clay soil, is injurious, as it retains too much moisture in wet weather, and becomes too hard in seasons of drought. This evil is somewhat corrected by deep ploughing, which loosens the soil, rendering it more permeable, and capable of retaining a greater quantity of water, without being injurious to vegetation.

85. If a sandy soil covers a clay sub-soil, it is much less exposed to the evil effects of drought, on account of the moisture retained beneath it; and by deep ploughing the clay may be mixed with and thus improve it.

86. These mixtures of the sub-soil and soil are not the only means that the farmer possesses of preserving in the land the moisture necessary to the vegetation of plants. Frequent working gives also to land the property of retaining moisture, and this is the case as well with a stiff as with a sandy soil. The cause of this has not yet been well explained, but it is so; and it is in contradiction to an opinion entertained by many, that frequent working in times of drought is injurious to the crop.

87. As a clay sub-soil is suitable to sandy land, just so is a sandy sub-soil favorable to a surface containing much clay. It permits the infiltration of the superabundant moisture, and may ameliorate the soil if mixed with it.

88. But a sandy soil, based upon a sub-soil of the same nature, being entirely too permeable to moisture, must suffer much from drought, and yield but indifferent crops. There is too great waste of manures, as their liquid parts sink too deep.

89. When the soil is devoid of carbonate of lime, and the subsoil is calcareous, a mixture of the two by deep ploughing is evidently beneficial. Stiff soils particularly will profit by this mixture; for at the same time they will lose a portion of their tenacity, become more favorable to vegetation, and rendered easier to work. But the carbonate of lime in the sub-soil must be in an earthy state, and not in the form of stones, a few only of which, the schistous, can, as we have seen, become friable on the surface.

90. From what precedes, we perceive that there are many cases in which deep ploughing can improve the soil, and increase its products. It is true that, in certain cases, these workings appear in the first years to injure rather

than benefit the soil. This is the case when the sub-soil contains principles, such as the oxyde of iron, that may be fatal to vegetation. But generally in a few years these injurious properties disappear, after the elements brought to the surface have been acted upon by atmospheric influences, and mixed with humus.

91. The farmer sometimes contents himself (and perhaps it is the best plan) with merely stirring the sub-soil, without bringing it to the surface. It is then acted upon by the atmosphere, and gradually mixed with fertilizing influences. This operation is performed by a plough made for the purpose, called a sub-soil plough, which follows in the furrow immediately behind the ordinary plough.

QUESTIONS.

1 Are the mineralogical elements of the soil and sub-soil of the same nature?
2. How many kinds of sub-soil are there?
3. Is a clay sub-soil favorable to a clay soil?
4. What is the remedy for too much moisture in a clay soil?
5. Is a sandy soil favored by a clay sub-soil?
6 Do frequent workings preserve moisture in the soil?
7. Is a sandy sub-soil favorable to a clay soil?
8. When the soil and sub-soil are both sandy, is it favorable?
9. Can a calcareous sub-soil improve the surface?
10. Which soils are most benefited by mixture with carbonate of lime?
11. In what state should the carbonate of lime be to produce an effect upon the soil?
12. In what circumstances would deep ploughing be disadvantageous?
13. How is the soil deepened without bringing the sub-soil to the surface?

LESSON XIII.

THE EFFECT OF CLIMATE ON VEGETATION.

92. The temperature requires great attention on the part of the cultivator; for it is well known what influence it exercises on vegetation, and that it varies according to

localities. In the northern states the cold is generally intense, and lasts a long time; whereas in the southern heat predominates. There are also countries that, by their position, are much damper than others, or which are more exposed to storms, hail, etc. It is to the aggregate of all these atmospheric circumstances, that we give the name of climate.

93. We may adopt three climates; the northern, the southern, and the mean, or intermediate. But these three climates may be subdivided to infinity; and it may almost be said, that each state, county, town, and village, possesses a particular climate of its own; for it is not a rare circumstance to see two neighboring places differ greatly in this respect.

94. The position of a district or place influences its climate greatly. There are places that enjoy a low (cold) temperature though beneath the equator. This comes from their position, which is much more elevated than the level of the ocean. This is partly the reason why the cold is always greater on the summit of high mountains than at their base; and it is also one of the reasons why very high mountains, though in southern countries, are always covered with ice and snow.

95. Each plant has not only a soil, the properties of which suit it better than those of any other, but it has also a climate appropriated to its nature. Moreover, the species of cultivated plants are in many cases as different as the temperature of the place in which they are found is more or less elevated (warm). Thus it is that in the south the cotton-plant, the sugar-cane, and the fig, flourish; whereas, if these vegetables were transplanted to the north, they would perish from cold.

96. Crops ripen much more rapidly upon a warm than upon a cold soil; so in southern climates vegetation is much more rapid than at the north.

97. Vegetation in general suffers from intense cold, but more particularly that of certain plants. But what does the most injury, in these cases, are the sudden changes in temperature; and the damage is greater to plants growing upon light soils. Whenever the temperature falls gradually, vegetation suffers but little. It is for this reason that a frozen plant should never be put in a warm place. To restore its vigor, we should give it a temperature that will cause it to thaw insensibly.

98. It is particularly after great moisture that plants suffer when overtaken by frost; for in this case the stem is more tender and watery. The water and sap, that are increased in volume by congelation, then burst the tissues of the plant, and destroy the vital principle of certain indispensable organs.

QUESTIONS.

1. What is the climate of a country?
2. What are the principal climates?
3. Are there others?
4. Does the position of a place influence its climate?
5. Can the same plants be cultivated in places of different temperature?
6. In which climate is vegetation most rapid?
7. Is vegetation injured by cold?
8. When is a change of temperature most hurtful?
9. How must we proceed to thaw a plant?
10. In what circumstances do plants suffer most from cold?

LESSON XIV.

THE EFFECT OF CLIMATE UPON CULTIVATION AND UPON ANIMAL ECONOMY.

99. In the preceding lesson, we indicated the causes upon which the state of a climate depends, and its general effects upon vegetation. We have yet to consider it under

another aspect; its influence on the cultivable properties of the soil, and the rearing of domestic animals.

100. A vegetable transplanted from one soil to another, does not at first grow with its original vigor. So is it in this case with men and animals. A sudden change of diet deranges for some time the animal organization; and a transition even somewhat protracted is always necessary. Plants require to be gradually accustomed to the new circumstances in which they are to grow; and often, when removed to a new climate, their conformation is changed, and their products, in both nature and quantity.

101. The study of climate is above all necessary when the object is to change, in any locality, the system of agriculture that has been for a long time prevailing there. In this case some trials should be made to ascertain whether the plant desired to be introduced into the rotation will succeed. The same precautions should be taken with the animals to be employed in agricultural labor.

102. In a damp climate, the defects of the lighter soils are less to be feared, as they are then less exposed to drought. The dampness of climate, however, does not depend so much upon the quantity of water that falls as upon the heat, more or less great, that causes it to evaporate. But it is well known that one country may possess a dryer climate than another, though more rain may fall in the first than in the second.

103. The Creator, who placed and arranged everything here in such admirable order, adapted also to man's wants all the plants that grow in the climate that he inhabits. In England, for instance, the climate, though damp in consequence of its vicinity to the ocean, is more regular than with us. Under such a climate succulent food is very necessary; accordingly nature favors, to a remarkable degree, the development of such plants as are necessary to the maintenance of numerous herds.

104. In the south, where the heat is greater, nature produces fruits, and other refreshing aliments, so necessary to man in warm climates. Animals too can be maintained differently from those in the north; for there the temperature permits them to pass the whole year in the open air. In the United States, between Maine and Florida, we have almost every variety of climate; consequently, in the way of agricultural products, the nation is singularly rich.

QUESTIONS.

1. Does a vegetable transplanted from one climate to another grow off at once?
2. In what instance is the study of climate particularly necessary?
3. Do the lighter soils suffer much in damp climates?
4. Are the productions of the different climates adapted to the peculiar wants of the inhabitants of those climates?
5. What is the condition of the United States in regard to climate?
6. What is their condition in regard to productions?

PART THIRD.

CHAPTER I.

Ameliorators.

LESSON I.

GENERAL VIEWS OF MANURES, AMELIORATORS, AND STIMULANTS.

1. Most of the products of the earth serve as food for men and animals. Among the latter, some furnish us with the necessary power to work the earth; others give us milk, cheese, wool, meat, etc. But that animals may continue to furnish us with these, the necessaries of life, they should be well cared for, and supplied with an abundance of healthy and nourishing food.

2. So is it with the earth. She never refuses us her gifts if she is well cared for, and her strength renewed, after furnishing food to exhausting crops.

3. All cultivated vegetables do not exhaust the soil to the same degree. The farmer should study carefully the properties of plants in this respect; for it is the only way to establish a judicious and profitable system of rotation. Thus, after a crop of clover, the land requires no manure; for it receives from this crop more than it gives; and it may grow another crop more or less exhausting, depending upon its previous condition.

4. That a soil should be productive, it must contain the mineralogical elements in suitable proportions. Each one of the simple bodies (silica, clay, lime, etc.) that we have described, is sterile in itself; it is only by their mixture that they can give the soil the qualities suited to vegetation.

5. If Nature has not always effected these mixtures in just proportions (and this is one reason of the difference in the value of land), she furnishes us, in return, the means of amelioration, that enable the farmer to supply this defect. It is precisely because the use of fertilizing means is neglected, that we see everywhere so much waste land.

6. The soil requires two species of elements that it is important not to compound. Some accrue from organic bodies, and are called *manures;* their principal object is to serve as food for plants. The others are the produce, for the most part, of the mineral kingdom, and take the name of *ameliorators;* they give the earth advantageous properties relative to cultivation, by improving its texture when either too stiff or too loose.

7. There are also other substances, such as plaster, which in most cases, without modifying the composition of the soil, give activity to the vegetation of plants, by forcing them to absorb more nourishment from the soil and atmosphere. These bodies are called stimulants.

8. The same substance may perform more than one function; it may serve at the same time as a manure and as an ameliorator. Dung, for instance, as we shall see hereafter, applied to certain soils, may at the same time furnish food to plants and force into action certain inert principles contained in the soil.

9. It is of the utmost importance to the success of the farmer, that he should give his attention to soils that are deficient in their composition; but above all things he should be acquainted with the mode of action, and the

manner of employing substances that are so necessary to the amelioration of his land. This knowledge must guide him both in his choice of ameliorations and in the manner of their execution. It is for this reason that, after the study of soils, we introduce that of ameliorators, the employment of which, in many cases, is indispensable.

QUESTIONS.

1. Do animals furnish products useful to man?
2. What must be done to enable them to continue the supply?
3. What must be done for the earth to enable it to continue its supplies?
4. Are all plants equally exhausting?
5. What must the farmer do in this respect?
6. What is necessary that a soil should be productive?
7. Are simple bodies always mixed in suitable proportions?
8. Why are there so many waste lands?
9. Which are the two species of elements required by the soil?
10. What are stimulants?
11. Can the same substances act in more ways than one on the soil?
12. To proceed properly in the amelioration of soils, what knowledge should the farmer possess?

LESSON II.

LIMING LANDS, OR THE USE OF LIME AS AN AMELIORATOR.

10. Lime, as we have seen, is a compound of oxygen and a simple body called calcium. To obtain it, carbonate of lime must be submitted to the action of heat until calcined. The water of crystallization escapes in the form of vapor, and the result is quick or caustic lime.

11. Besides the use that is made of lime in building, it is also employed as an ameliorator in those localities in which agriculture is in a state of improvement; and if farmers have not often recourse to this means of increasing the value of their lands, it is because they are generally ignorant of the good effects it produces, or because

they do not know in what circumstances liming can be advantageously effected.

12. To use lime as an ameliorating substance, it is necessary that the farmer should know how to distinguish the soils that would be improved by the application of calcareous ameliorators. In effect, it is useless to add humus to land containing already enough; just so is it useless to add lime to land that has enough. It would be a useless waste of labor, and might produce injurious consequences.

13. The carbonate of lime, then, as an ameliorator, is only suited to such lands as do not contain calcareous principles. It is easy to recognise them: whenever an earth, brought in contact with an acid, produces an effervescence, we may be certain that it contains a sufficiency of lime to produce the desired effect upon such organic parts of difficult decomposition as may be contained in the soil.

14. The spontaneous vegetation, also, frequently indicates the lands upon which lime may be used to advantage. Thus, those lands upon which broom, red sheep-sorrel, heath, the chestnut, and resinous trees, grow spontaneously, are generally disposed to increase in value by the application of lime.

QUESTIONS.

1. What is the composition of lime?
2. How is it obtained?
3. What use is it put to?
4. Why is not its use more general in agriculture?
5. What ought the cultivator to know to make use of lime?
6. Are calcareous soils improved by liming?
7. How are calcareous soils recognised?
8. By what sign do we recognise the utility of liming a soil?

LESSON III.

LIMING LANDS (CONTINUED).

15. We have seen that, as an ameliorator, lime is not suitable to calcareous soils; but we are not thereby to understand that it is to be employed with advantage on every other kind of soil. It has been remarked, on the contrary, that on certain soils, lime has produced no effect whatever, without its being possible to discover in their composition any explanation of the fact.

16. We may then conclude that soils, independent of their composition, are more or less disposed to improvement by calcareous ameliorators. Trials should be made in this respect; and this means of amelioration, where it can be employed, should never be neglected.

17. Lime has frequently been employed with disadvantage, because it was looked upon as a manure. If organic remains are found in the soil, in tolerable quantities, we may certainly obtain by means of lime alone tolerably fair crops, for two or three years in succession; but after this time we will have an exhausted soil, that will return with great difficulty to a productive state. By liming without manuring, we would give the soil a factitious activity, that would be followed by sterility.

18. We ought then to consider the liming of land as a means of preparing the food of plants, and of putting in action inert principles that otherwise would have remained dormant and unproductive; but we must not think that lime itself is a principle of nourishment. Perhaps, as is supposed by a distinguished German author,* liming may also supply the roots with a quantity of carbonic acid, in addition to that furnished them by the humus.

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* See Von Thaer, in the "Farmers' Library and Monthly Journal of Agriculture."

19. It is wrong to pretend, as some do, that the effect of lime is different as it happens to be in the state of carbonate or that of quick-lime. Facts prove the contrary, and theory agrees with them. In effect, lime, when it comes from the kiln where it is quick, is deprived of its carbonic acid; but it recovers it very soon when placed in the soil, by taking possession of that which it finds there, or by drawing it from the atmosphere. Thus, whether we place the caustic lime or the carbonate of lime in the earth, it must in the end be carbonate of lime that produces the effect. Only lime deprived of its carbonic acid, may be employed in rather smaller quantity.

20. We repeat, to fix the attention upon the utility of lime, that the farmer ought by all means to make a trial of it on a small scale, upon the different species of soil that he cultivates. He may be guided by the result of these experiments. Without this precaution, he would run the risk of losses, often heavy.

QUESTIONS.

1. Does lime produce an effect on all soils that are not calcareous?
2. What ought to be done to ascertain if a soil should be limed?
3. What is the error that has often caused liming to be abandoned?
4. What is the effect of lime without manure?
5. How ought we to consider the liming of land?
6. Is there a difference in the effect of carbonated and caustic lime?
7. What should the farmer do to decide about liming?

LESSON IV.

LIMING LANDS (CONTINUED).

21. We have seen that lime gives activity to vegetation, by the property which it possesses of decomposing humus and rendering it sooner fit to serve as food to plants. I

also destroys the acid principles in the land; but this must not be in a low, wet state, or it must first be drained.

22. Moreover, lime, when it acts, according to the opinion of some writers, gives additional strength to the straw of the different cereals, and thereby prevents them from falling or lodging. It corrects the defects of soils that are too cold and wet, and increases the porosity of those that are too stiff. It consequently influences, in a sensible degree, the yield of crops.

23. We have seen (No. 19) that the effect of carbonate of lime does not differ from that produced by quick-lime; this last, however, should be preferred, and for this reason: Calcareous substances, to produce all the effects to be expected from them, should be in an earthy state. It is then necessary that the carbonate, before being employed, should be pulverized, or reduced to powder; this is easily done by calcination. To pulverize it in any other way would be tedious and expensive.

24. When we are assured that a soil contains no calcareous substances, the next thing to be ascertained is the quantity of lime to be employed, and the time and manner of applying it. Here are some rules to be followed in this respect.

25. The quantity of lime to be used depends, in general—1. On the durability desired to be given to the amelioration. 2. The nature of the soil to be limed. 3. The nature of the lime that is used. It is by the examination of these three causes that we can ascertain the quantity of lime necessary to be applied. It is, however, understood that clay soils, particularly those that are cold turf-lands, and the soils in which organic remains do not readily decompose, require heavier liming than light and sandy soils. On the last, not more than half as much is used as in the first.

26. Lime may be applied to the land in different ways, and at different periods. 1. It may be laid on the surface

of mowing or pasture land, and remain there until it is ploughed up for tillage, even though this should be several years afterward. The lime in this case quickly sinks into the soil, and, acting upon it, prepares it for crops when it is again tilled. 2. It may be spread upon the ground, and covered by the plough, just after a crop of any kind has been gathered. In this case, it prepares the soil for the succeeding crops. 3. It may be spread upon the surface even when plants are growing. This practice, however, though sometimes convenient, is rarely to be imitated. 4. It may be and is most frequently applied during the season when the land is in fallow, or in preparation for what are termed fallow crops.

27. That lime may produce an immediate effect, it must be thoroughly mixed with the soil; and this is why it is generally put upon a fallow, a year or more before it is broken up. There is a very simple machine now in use, called a lime-spreader, that is attached to the tail of an ordinary cart, which spreads the lime very evenly.

28. The effect of lime is sometimes not perceptible until the second or third year; this is when the mixture with the soil has not been properly effected. It is very important that land should be well drained before being limed, because lime improves only such as are moist by nature, and not by position.

QUESTIONS.

1. What is the action of lime upon land?
2. What are the other effects?
3. Why prefer quick-lime to carbonate of lime?
4. Before liming, what is it necessary to know?
5. On what generally depends the quantity of lime to be employed?
6. Which soils require the most lime?
7. In what quantities is it applied?
8. How is the spreading best effected?
9. What should be done to enable lime to produce an immediate effect?
10. Is a soil in a wet situation improved by liming?

LESSON V.

MARL AS AN AMELIORATOR.

29. We have seen (No. 42, second part), that marl is a compound of carbonate of lime mixed with clay, silica, shells, and other inorganic substances, in various proportions. The quantity of calcareous principles that a marl contains has a direct influence upon its use as an ameliorator, and for this reason it has been thought useful to distinguish several kinds of marl, that each suit soils of a different nature.

30. The principal kinds of marl are: 1. The calcareous; those containing the most carbonate of lime, and which are consequently the richest. 2. Marl properly so called, that does not contain more than half its weight in calcareous substances. 3. Clayey marl, that contains three or four times as much clay as marl. 4. Marly clay, that contains the feeblest portion of calcareous carbonate.*

31. Marl can not always be recognised simply by the eye; to distinguish it, it is necessary to have recourse to the means indicated in treating of the mineral parts of the soil.

32. The same error that prevents the use of lime also prevents that of marl, in many instances, when it should be used. It has been often used as a manure, when it should merely be considered an ameliorator. Whenever lime or marl is used upon a soil deficient in the proper quantity of organic remains, so far from producing any effect upon the physical properties of the soil, it will be apt to injure by giving it too much activity.

33. Marl, by its beneficent properties, should play an important part in the agriculture of many districts in the

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* There are many other varieties not necessary to describe.

United States, particularly along the seaboard, and in the southwestern states, where it abounds in vast beds of the finest quality. In New Jersey, Delaware, Maryland, and Virginia, exhausted and wornout lands have been brought to the highest state of productiveness by abundant marling. Its great abundance and richness, in the now wornout lands along the tidewater of the old southern states, will yet make them rival the virgin fertility of the western states, and perhaps give the tide of emigration a new direction. Like lime, it improves alike the texture of sandy and stiff lands, and it has the advantage of lime in being generally cheaper.

34. Before using marl as an ameliorator, we should know how to discover whether a soil contains carbonate of lime ; and we should be able also to determine the quantity of this substance. To make this experiment (and there is no sort of difficulty about it), a portion of the soil to be tried is taken at a certain depth, and not on the immediate surface ; for this last might, independent of its primitive composition, contain calcareous substances, placed there at some period more or less remote.

35. The following is the very simple process by which the proportion of calcareous matter contained in marl is determined. Take a set of delicate scales, and after drying, without hardening, one hundred grains of the earth to be tried, they are put in a vessel, and a sufficiency of water to crumble it to an earthy consistence is added. Upon this a few drops of nitric acid are thrown, and the mixture is worked up with a wooden spatula ; effervescence immediately takes place ; and the carbonic acid escapes. This last is replaced by the nitric acid, which then forms a nitrate of lime. As this body has the property of remaining suspended in water, it is expelled by several successive washings ; taking always great care that the other earthy particles are precipitated to the bottom of the

vessel. After this, the residuum is nothing more than clay and silica, the weight of which is easily ascertained by the scales. If we then compare it with the original quantity operated on (that is, the hundred grains), the difference will be the exact quantity of carbonate of lime contained in the marl; for the diminution is occasioned by the escape of the carbonic acid gas, besides the lime that was expelled with the nitric acid.

QUESTIONS.

1. Why do we distinguish several kinds of marl?
2. Which are the principal kinds of marl?
3. Can we distinguish marl simply by the eye?
4. Why has so little marl been employed?
5. What is the effect of marl applied to lands that do not contain a sufficiency of organic remains?
6. What is the effect of marl on the fertility of lands?
7. Where does it most abound in the United States?
8. What is it well to know before using marl?
9. How do we ascertain the quantity of carbonate of lime contained in a soil?
10. What advantage does marl generally possess over lime?

LESSON VI.

MARL AS AN AMELIORATOR (CONTINUED).

36. In the preceding lesson, we have made known the different species of marl, and also the means of distinguishing them. The question now to be examined is, to which species of earth is each kind particularly suited?

37. In general, as marl is only employed on account of the carbonate of lime it contains, it is without effect upon calcareous soils, unless the object is an amelioration by clay. The action of the farmer, as regards the amelioration of calcareous as well as other soils, depends upon the object that he wishes to attain.

38 Calcareous marl is that which agrees best with clay soils. Clayey marl and marly clay are best suited to gravelly and sandy lands; but the great quantity that it is often necessary to employ in this case leads to such expense as not always to permit the farmer to make such ameliorations.

39. In case that it is desired to employ calcareous substances on light lands, they should generally be used in small quantities; for these soils are naturally disposed to dryness, and to decompose manures; whereas, as we have seen, the reverse is the case with stiff lands.

40. Marl properly so called suits, as it were, every kind of soil, giving porosity to the clayey and compactness to the silicious.

41. Though marl is adapted to the amelioration of certain soils, it does not follow that it is fertile in itself. On the contrary, a soil containing too much of it would possess the defects of lands too highly calcareous, and it could only be rendered productive by unusual quantities of manure.

42. Marly earths favor the vegetation of certain plants that can serve as indicators to the farmer in search of marl.

43. We have just demonstrated that the action of marl depended upon its composition, and that of the soils to which it is applied. As to the quantity that should be employed, it is subordinate to three principal circumstances, namely: 1. The nature of the soil. 2. The nature of the marl. 3. The durability desired for the amelioration. This durability depends not only on the quantity of the marl to be employed, but also upon its richness Generally, from twenty to sixty double-horse cart-loads are used; but soils on which marl is used only for its clay require a much larger quantity.

44. That marl may be effective, the soil must not be

wet. Though calcareous substances correct the defects of lands that retain water, it is when these defects proceed from their composition, and not from their situation.

45. It is generally in autumn that marl is hauled upon the land, because then it becomes rapidly friable from the effects of rain and frost, and can be more easily and evenly spread.

QUESTIONS.

1. Does marl agree with calcareous soils?
2. What species of marl should be employed on calcareous soils?
3. What species should be used on gravělly and sandy lands?
4. Should marl be used in large quantities on light lands?
5. To what soil is marl, properly so called, best adapted?
6. Is a marly soil fertile in itself?
7. Are there certain plants that by their presence indicate the existence of marl?
8. On what does the action of marl depend?
9. On what does the quantity of marl to be employed depend?
10. Does marl improve wet lands?
11. At what time is marl usually hauled out?

LESSON VII.

CLAY AND SAND AS AMELIORATORS.

46. It is important here to correct an error frequently met with in works that treat of the improvement of the soil. Almost all of them recommend clay as an ameliorator of sandy soils, and sand for clay soils. Here again practice is in contradiction to theory, and has proved that clay and sand can not serve as amcliorators one to the other, as they will not combine; or at least they do so with great difficulty.

47. Let us examine the effect that each of these bodies is destined to produce upon the different soils. Sand ought to act upon soils in which clay predominates; for

these soils, being generally too compact, and consequently too hard, require the application of substances tending to lighten them ; and sand, as we know, possesses this property in a high degree, when it enters in a sensible proportion into the composition of a soil. But to produce this effect, it must be combined with the other elements of the soil ; for where it is merely mixed with the soil, it does not loosen it.

48. In fact, the experiments that have been made with sand prove that it has a constant tendency to descend through the arable surface, and that it reaches the sub-soil without having acted. It does not enter into the molecules of clay to form but a single body with them ; it does not then prevent these molecules from remaining agglomerated among themselves ; and consequently it loosens very little, if any, stiff clay soils.

49. But suppose even that the mixture of sand and clay was advantageous, this means of amelioration would be impracticable, on account of the immense quantity of sand required, and that it would be necessary often to renew, from its tendency to sink to the sub-soil.

50. It is only where a clay soil is based upon a sandy sub-soil, that it would be advisable to seek to mix the last with the first, by means of deep ploughing ; and this should be done gradually, by setting the plough deeper each time the field is worked. The increase in depth should be gradual, in order to give the mineral parts of the soil and sub-soil time to adhere and combine, as it were, among themselves.

51. Another means of ameliorating clay soils is to submit the superficial crust of the arable layer to the action of fire. Particles of the clay are hardened by the heat, and produce the same effect as gravel and sand. But this method of loosening the land is liable to the same objection as that by means of sand ; the calcined particles being

harder than the rest of the clay, are finally separated from it, and pass into the sub-soil. It has, however, the advantage of sand in being cheaper. (We will explain the process of calcination under the head *Paring and Burning.*)

52. Ploughing at the proper season, the application of lime, and a sufficient quantity of manure, are the best means of ameliorating stiff soils. As the action of frost usually renders these lands more friable, they should be broken up in the autumn.

53. The same reasons that prevent the improvement of stiff lands by means of sand, hold good against the improvement of sandy lands by the use of clay. There are, however, but few cases in which the improvement of purely gravel or sandy lands will pay at all.

QUESTIONS.

1. Can sand and clay serve as mutual improvers?
2. Why is it that sand does not render stiff lands more friable?
3. What other reason is there for not using sand as an improver of stiff soils?
4. In what cases would it be proper to mix sand and clay?
5. Is there not another method of improving stiff soils?
6. What are the best means to improve stiff land?
7. Why should not gravelly and sandy lands be improved by the application of clay?

CHAPTER II.

Stimulants.

LESSON IX.

ASHES.

54. AMELIORATORS, as we have seen, do not exercise a direct influence on vegetation; they are generally destined to modify the nature of the soil, by rendering it lighter or more compact (see Nos. 6 and 7). There are other substances again which, without modifying in most cases the texture of the soil, exercise a direct influence on vegetation, by exciting the organs of plants to draw a greater quantity of food than they otherwise would from the soil and the atmosphere. These substances are called *stimulants.*

55. Sometimes a stimulant has also the property of modifying the texture of a soil; in this case it may be called a *stimulating ameliorator.* Some kinds of ashes come under this head; and it is for this reason that we treat of them immediately after the ameliorators.

56. We give the name of ashes to the residuum left by the combustion of organic substances of vegetable or animal origin. The efficacy of these ashes depends, in a great measure, on the elements of which they are composed. The principal kinds employed are wood, turf, and coal ashes.

57. Wood ashes are the most valuable, and more generally used. They are formed of salts, of earths, and metal-

lic oxydes.* The smaller the quantity of earths and oxydes contained in ashes, the greater is their value. Slaked ashes produce a better effect than the unslaked.

58. There is a great analogy in the action of ashes and lime. Like lime, they are best upon soils that are not calcareous, and upon those on which the carbonate of lime is the most effective. They loosen and increase the fertility of compact soils; but it is only in favorable situations, in the vicinity of cities, that they can be procured in sufficient quantity for this purpose. But in all cases they must be well spread.

59. Ashes appear to agree better with *well-drained* moist lands than with those that are naturally dry. As is the case with calcareous amelioratora, they should never be considered as manures; for they, on the contrary, hasten the exhaustion of the soil, by forcing the plants to take from it a greater quantity of nourishment.

60. Ashes are exceedingly beneficial to almost all crops; and in the vicinity of cities they are eagerly sought after, and used to an extent only limited by the supply.

61. Ashes are very generally recommended to ameliorate meadow-lands, applied to which, they enable the better grasses to compete successfully with moss, rushes, and other noxious plants. This is, however, not always the case.

QUESTIONS.

1. What is the difference between ameliorators and stimulants?
2. What is a stimulating ameliorator?
3. On what does the efficacy of ashes depend?
4. From what are ashes principally made?
5. Of what are ashes composed?
6. On what does their value depend?

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* The salts contained in ashes are, the carbonate of lime, the carbonate, the sulphate, and hydrochloride of potash. The earths are, silex, alumine, and magnesia. The metallic oxydes are, iron, and manganese.

7. Upon what soils are ashes of the most value?
8. With what kind of land do they best agree?
9. Should they be used as manures?
10. What is the effect of ashes applied to meadow-land?

LESSON IX.

PLASTER.

62. Plaster, as we have seen, is composed of sulphuric acid and lime. It is also called gypsum; but this last name is that by which the stone or rock is designated, before it is ground into plaster.

63. The manner in which plaster acts, and its value, have long been subjects of controversy among agricultural chemists; some contending that it serves as a direct food to certain plants (Johnson), others that its utility consists in its power of absorbing the gases, and holding them in contact with the roots of vegetables (Liebig).

64. It is sufficient, however, to state here, that it is a forcible stimulant to many cultivated crops, quickening, in a remarkable degree, the vital energies of plants.

65. On some soils the action of plaster is scarcely perceptible; but as it is a cheap substance, and of easy transportation and application, it should always be tried. Professor Johnson has ascertained, by analysis, that an ordinary crop of clover or sainfoin will yield per acre from one and a half to two hundred weight of sulphate of lime. This is precisely the quantity usually applied per acre in those parts of the country where plaster is in most general use.

66. Plaster should be sown broadcast in calm weather, when the dew is still upon the grass, at the rate of a bushel to the acre.

67. Plaster seems to act most readily upon corn, clover

peas, tobacco, etc. It has been recommended to whiten the floors of stables, to prevent the escape of the ammonia from the urine and manure.

68. The application of plaster to timothy meadows is of doubtful utility, as it encourages the growth of the clovers at the expense of the other grasses.

69. Plaster must not be confounded with other calcareous ameliorators. These last act upon the soil by rendering it fit for any crop, whereas plaster in no way changes the nature of the soil.

QUESTIONS.

1. What is plaster?
2. How should it be applied?
3. What quantity to the acre?
4. Why is it of doubtful utility on timothy meadows?

LESSON X.

PARING AND BURNING.

70. As yet, this is a means of amelioration little used in the United States. Its effects are very similar to those of calcareous substances, and in some localities it may be less expensive.

71. The object of this process is to render active all inert organic substances; it will consequently be of little use on lands containing but little vegetable matter.

72. The operation of paring is usually done in dry weather, in spring or summer. The surface or sod is turned up with the spade or plough, to the depth of three inches; the sods are then set on edge to dry, and when dry are disposed in heaps, in a shape favorable to combustion. Dry brush is then put under them, and slow fires kept up, until the whole are reduced to ashes.

73. There are very few processes more beneficial to old meadows than this, as it destroys thoroughly all noxious plants, and vast quantities of insects. A good dressing of manure should follow this operation in the second year, on account of the stimulating effects of the operation on vegetation.

QUESTIONS.

1. What are the effects of paring and burning?
2. What is the object to be attained?
3. When and how is the operation performed!
4. Why is it advisable to apply a dressing of manure a year after the process?

CHAPTER III.

Manures.

LESSON XI.

FORMATION, COMPOSITION, AND ACTION OF MANURES.

74. All substances, both liquid and solid, of vegetable or animal origin, that by their decomposition fertilize the earth by serving as food for plants, are called manures. Thus, a crop of clover turned in by the plough, as it decomposes, furnishes a supply of manure of vegetable origin. The remains of dead animals, on the other hand, furnish manure of animal origin.

75. Manures may be divided into several classes: 1. Ordinary manure, a mixture of animal and vegetable substances. 2. Animal manure, strictly of animal origin. 3 Vegetable manures, as green crops turned under, straw, etc.

76. The value of manures depends upon their nature. Those of animal origin are usually exceedingly active, and of little duration. Among vegetable substances, those most valuable as food are also most valuable as manure.

77. The continual application of purely vegetable manures will not bring land up to the highest degree of fertility. They must be aided by animal manures, which, by means of the azote which they contain, exercise upon the soil a peculiar influence.

78. Though in general the development of plants is greatly favored by the application of manures, yet there are cases in which they will do more harm than good, if great attention is not paid to their condition and mode of

application. Thus, the liquid manure from the stable may burn the plants to which it is applied, if it has not been fermented and mixed with a due proportion of water.

79. Other manures again, though beneficial to the growth of plants, are often injurious by introducing and encouraging the growth of weeds that are afterward found difficult to extirpate. This is more commonly the case with *unfermented manures.*

80. The vast importance of manure to the farmer is too generally acknowledged to make it necessary here to argue the question. The profits of the farmer depend upon the quantity of manure that he applies to his crops. It is very evident that the amount of labor required to produce a crop is the same for poor as for rich land; and yet what a difference in the yield!

QUESTIONS.

1. What is manure?
2. How may manures be classed?
3. Are they of equal value?
4. What are the most valuable vegetable manures?
5. Will vegetable manures alone give to the soil the highest degree of fertility?
6. How are manures sometimes injurious?
7. On what do the profits of the farmer principally depend?

LESSON XII.

MANURE (CONTINUED).

81. Manure is a mixture of the excrements of cattle with stable-litter. This is the most important species of manure to the farmer, as it is generally that which he can manufacture most easily.

82. To enable himself to make the necessary quantity of manure, the farmer should keep a quantity of stock pro-

portionate to the size of his farm. In this respect, however, it is difficult to lay down any general rule, and say that so many acres require so many cattle; because the quantity of stock that a given quantity of land will support depends as much upon the quality of the land, and local causes, as upon the number of acres.

83. In the production of manure, the quantity of stock is not the only thing to be studied; all the animals on a farm should not only be fed, but well fed; and the quantity of food that they will require depends upon their size and species. Besides, when the manure is thrown out in heaps from the stable, its value may be greatly affected by its management.

84. The excrements of animals are not entirely composed of the residuum of the food that has passed through them; they contain also certain particles belonging to the bodies of the animals. These particles are, in greater or less quantity, dependent on the fatness of the animal; when the beast is poor, there will be fewer of these animalized particles that increase the value of the manure.

85. Hence we may easily understand the great difference in the value of manures accruing from well-kept cattle, and those that are barely kept alive. If the farme contents himself with feeding his cattle on substances of difficult decomposition, and containing but little nourishment — as, for instance, straw — this food will pass through their bodies without undergoing any great change, and without being animalized, in consequence of the leanness of the beast, brought about by such a diet.

86. If the quality of the food affects the quality of the manure, so does the manner of keeping cattle affect its quantity. Cattle are usually kept in two ways; at large in pastures, or in stables. This last method, if possible, should be preferred; of course, allowing the animals to run out sufficiently for exercise. Sheep are, however, an

exception to this rule, as they thrive much better in pastures.

87. When animals are pastured, there is a great loss of manure. Without taking into account the manure lost, the pasture suffers much in wet weather from the poaching of the hoof. It is generally thought that those meadows yield most on which the afterswath (that is, the grass that grows after the crop of hay is made) is never depastured. Those farmers that keep their cattle up (soil them) contend that they get four or five times as much manure as they do when the animals are grazed; but the advantages of soiling often depends upon local circumstances, climate, price of labor, etc.

QUESTIONS.

1. What is manure?
2. What must the farmer do to obtain the necessary supplies of manure?
3. Can fixed rules be established on this head?
4. Do excrements contain anything more than the remains of food?
5. What causes the difference in value between the manure from fat and that from lean cattle?
6. Does the manner of keeping stock affect the quality of manure?
7. What are the usual methods of keeping stock?
8. Which is to be preferred?
9. What are the objections to grazing?

LESSON XIII.

LITTER, AND LIQUID MANURES.

88. Litter is, in many ways, indispensable to the farmer; it is indispensable to the health and comfort of his stock, by affording them good warm beds in winter, and maintaining them in a proper degree of cleanliness. Again, as regards the formation of manure, it is of the utmost importance; it not only moderates the activity that

in pure dung is too great for some soils, but it renders the hauling and spreading of the manure much easier.

89. Those vegetable substances most generally used as litter are straw, leaves, weeds, etc. But straw is usually preferred, as it is a better absorbent of the liquids, and is more readily decomposed.

90. The value of manure diminishes in proportion to the quantity of litter employed after we reach a certain point; but still it is best to use it with a liberal hand.

91. Urine is the most valuable portion of manure, and should always be saved with the utmost care. It should never be applied in a pure state, as its great activity would be hurtful to vegetation.

QUESTIONS.

1. Why is litter of importance to the farmer?
2. What vegetable substances are usually employed as litter?
3. Why is straw preferred?
4. Does the quantity of litter add to the value of manure?
5. Is the urine of value?
6. Should liquid manures be used in a pure state?

LESSON XIV.

MANAGEMENT OF MANURE.

92. The manure should be drawn from under the cattle every day. This certainly should be done with horses; as to fattening cattle, some feeders pretend that they fatten more kindly when surrounded with a warm atmosphere, filled with vapor. A warm atmosphere is no doubt good, but it should be pure.

93. It is not usual to haul manure immediately from the stable to the field; in the meantime, the care that is taken of it, or its management, has great influence on its quantity and value.

94. The manure-heap should be made on a spot convenient to the stables and cow-sheds; and space should be prepared, in the form of a dish or saucer, of a size proportioned to the quantity of stock kept — so situated as to catch the drainage of the stables, and protected as much as possible from the access of rain-water. This basin should be made impervious to water, if possible, to prevent the loss by infiltration of the liquid manure. In the centre a short pump is often placed, to enable the farmer to get at any time a supply of the liquid, either for moistening the manure-heap when too dry, or for spreading on his crops.

95. The length of time that manure remains in the heap before decomposition takes place, depends upon the species of animal that produces it. That from hogs enters more slowly into fermentation than that of horned cattle. The manure from horses and sheep decomposes soonest. To avoid loss by evaporation, it is recommended to sprinkle the heap two or three times a week with such substances as plaster, to fix all the volatile principles.

QUESTIONS.

1. When should the manure be thrown out of the stable?
2. Is it as important to clean out the cow-shed every day as it is to cleanse the horse-stable?
3. How is the manure to be managed?
4. How is the cattle-yard made?
5. Which of the manures decomposes most rapidly?
6. Which decomposes most slowly?
7. Why should plaster be sprinkled on the manure-heap?

LESSON XV.

VARIETIES OF MANURE.

96. THERE is very little distinction made in farming between the different kinds of manure; the employment of special manures is not as yet practised on a large scale in this country. The value of manures depends upon the quality of the food that the stock consumes, and upon the care that is taken of them. It may be useful, however, to say a few words upon each particular kind.

97. Manures may be divided into five principal classes. that from horses, that from sheep, that from cattle, that from hogs, and that from poultry.

98. Horse-manure is very active and ferments very readily. It is used by gardeners for hot-beds. It acts best upon clay soils; but its effects are not permanent.

99. Sheep-manure, when kept moist, ferments rapidly, and is of more value than horse-manure.

100. Cattle-manure does not decompose as rapidly as the preceding. It suits light lands better, and though less energetic, is more durable in its effects.

101. Hog-manure is usually very valuable; but the value is dependent on the quality of their food.

102. The sweepings of poultry-houses make a capital manure; dried and reduced to powder, they make a good top-dressing to all crops.

103. It is important that manures should undergo a degree of fermentation before being hauled out, as the seeds of weeds contained in it are thereby destroyed. As a general rule, barn-yard manure is given to the hoed crops that precede the small grains; the quantity depends upon a variety of circumstances — the nature of the soil, the crop to be planted, etc.

104. There are four modes of applying manures; in the

hill, the drill, ploughing under, and top-dressing. This last is the only one that can be applied to meadows.

105. Manure should be spread upon the land as soon as possible after it is drawn out; when left in piles upon the field, if a rain should come, the strength of the manure is washed out, and the crops would lodge in the spots occupied by the heaps of manure, and receive little benefit in other places.

106. Liquid manures are applied by means of a hogshead on wheels, similar to those used in watering the streets of cities; and are generally used on mowing-grounds.

QUESTIONS.

1. Is there any great distinction made in general farming between the different manures?
2. On what, in general, does the value of manure depend?
3. How may the different kinds of manure be divided?
4. What are the peculiarities of horse-manure?
5. What is peculiar in sheep-manure?
6. What in that of cattle?
7. What in that of hogs and poultry?
8. Ought manure to be hauled out fresh, or decomposed?
9. Ought the manure to lie in heaps for a long time, in the field, before being spread?
10. How is liquid manure carried out?
11. On what is it generally used?

LESSON XVI.

FOLDING SHEEP—ANIMALIZED MANURES.

107. The folding of sheep, though not much practised with us, is very general in some countries, and is attended with many advantages. The system is best adapted to light, sandy lands, and to places of difficult access to the manure-carts.

108. The fold is usually made with netting or light scantling, so arranged as to be easily taken apart. The form is square. The sheep are driven in every night, and the fold is removed when the ground occupied by it is sufficiently manured.

109. Among animal manures, we may mention flesh, blood, bones, horn, poudrette, etc., as all being exceedingly valuable.

110. When a horse, or a cow, or a sheep, dies upon the farm, it should never be left to taint the air by its decay. It should be covered with mild lime, and then a heap of earth thrown over it, of some eight or ten times its own bulk. This earth becomes saturated with the fertilizing gases, and furnishes a load or two of manure, well worth the trouble of making.

111. Bones have been known and used as a manure for a long time past; and on the lighter soils, to which they are adapted, they constitute the most valuable auxiliary fertilizing substance that has yet been discovered. The bones are reduced, in a proper machine, to the size of half an inch, and strewed upon the land, at the rate of twenty bushels to the acre. The effect on favorable soils is great and lasting; and they succeed best on all light lands, on limestone soils, and on the lighter loams. On all wet lands, whether clays, damp loams, or moist gravels, they do not pay. The inference from this is, that *bones are best suited for dry seasons and climates.**

QUESTIONS.

1. When is the sheep-folding system advantageous?
2. How is it done?
3. Mention the animal manures.
4. How can the carcasses of dead animals be turned to account?
5. What is said of bones as a manure?

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* In the face of these facts, it would be incredible, were it not a matter of record at the customhouse, that people of the proverbial acuteness

LESSON XVII.

VEGETABLE MANURES.

112. The ploughing down and covering in the land of the crops of green, juicy plants, to act as manure, was a practice of the ancient Romans, and is yet followed in Italy, and other parts of the old world. This mode of fertilizing suits best in the warmer climates, where vegetation is rapid and luxuriant. The plants used for the purpose are of the leguminous kinds, clover, pease, buckwheat, etc.

113. Green manures are often more costly than is generally supposed. This is proved by deducting from their value, 1. The price of seed. 2. The cost of sowing, and the rent of the land for six months. We must infer from this, that this system is only profitable in the following cases: 1. When the lands are inaccessible to carts, or very remote from the farm-yard. 2. When other manures are not to be had, except at extravagant prices. 3. When there is a want of straw, or other litter, to make manure.

114. The choice of the plants to be turned in must depend, in a great measure, upon climate. Thus, in the northern states clover flourishes; whereas, in the south the pea, in different varieties, is substituted for it. The south has doubtless many valuable acquisitions yet to make from Europe, in the way of herbaceous plants to be used both as fodder and as green manure.

115. The proper moment to turn in all plants that are used for this purpose, is at the time of blooming; for, as maturity approaches, all the nutritive principles, distributed in the different organs, combine to nourish the oviary and form the seed. This last then seizes upon nearly a

---

of the New-Englanders, should suffer cargoes of bones to leave Boston, to enrich the fields of a foreign and a rival nation.

the elements of nutrition that the plant contains; and, if we delay until it is completely formed, the value of the manure is lost.

QUESTIONS.

1. What are green manures?
2. What climates is the system best suited to?
3. Are green manures costly?
4. How are we to calculate the expense?
5. What plants are used as green manures?
6. How are we guided in the choice of plants to be used for this purpose?
7. At what time should the plants be turned under?

THE END.

THE

AMERICAN BIRD FANCIER;

CONSIDERED WITH

REFERENCE TO THE BREEDING, REARING, FEEDING,
MANAGEMENT, AND PECULIARITIES

OF

CAGE AND HOUSE BIRDS;

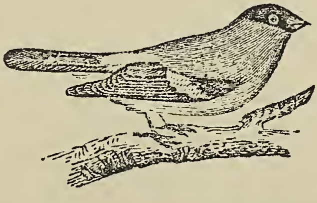
WITH REMARKS ON THEIR

DISEASES AND REMEDIES;

DRAWN FROM AUTHENTIC SOURCES AND PERSONAL OBSERVATION.

BY Daniel Jay BROWNE,

AUTHOR OF THE SYLVA AMERICANA, THE AMERICAN POULTRY YARD,
ETC., ETC.



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ADVERTISEMENT.

IN issuing the present little treatise, the publisher would say a word respecting its character and the manner in which it has been composed. He is fully aware of the limited nature of the work, when compared with the boundless science of which it forms a part, and would have cheerfully extended the subject had he believed the wants and economy of the American public required it. To those who wish further to pursue the subject, he would recommend the more elaborate treatises of Audubon, Wilson, Bonaparte, Nuttall, and Dekay, for American birds, and particularly the works of Dr. Bechstein for the birds of Europe.

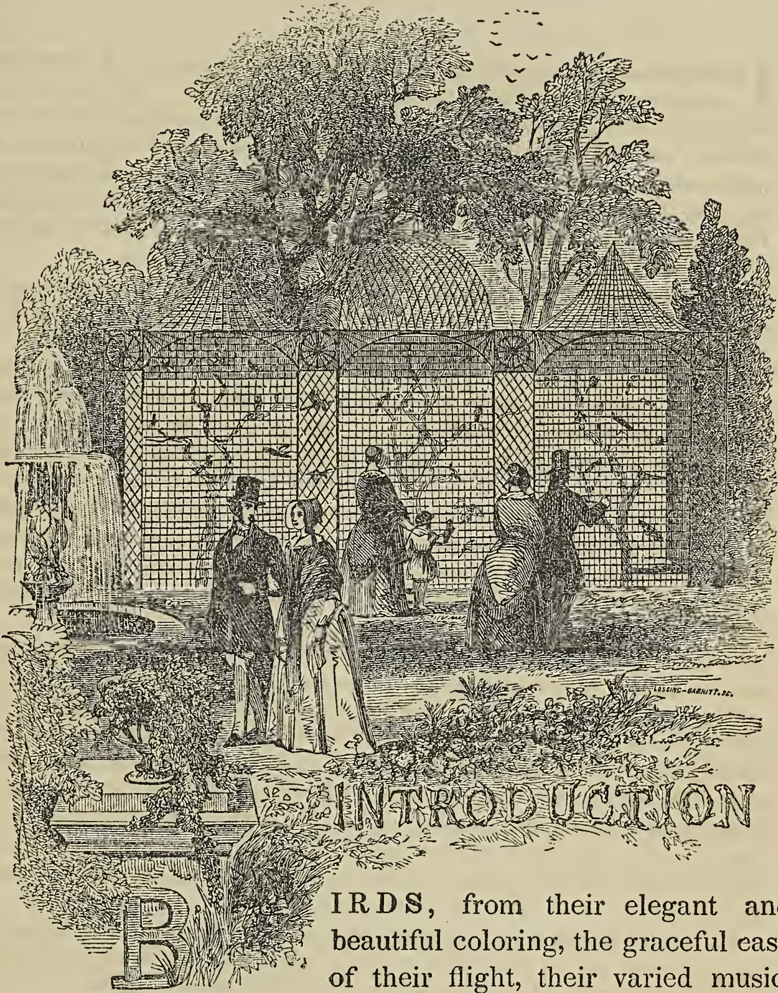
An intimate knowledge of Natural History, being an enthusiastic lover of the feathered tribes, having been familiar with them from his earliest childhood, has well qualified Mr. Browne for writing this, and if necessary, an extensive work. He will doubtless be recollected by many as the editor of "The Naturalist," a monthly periodical, published in Boston some twenty years ago, and more recently as the author of the "American Poultry Yard" and of a treatise on American trees Within the above-named period, he has travelled and resided for a considerable time in various parts of North and South America, the West Indies, Europe, and Western Africa, (having passed several months at the Canary Islands,) for the express purpose of investigating, among other objects, the natural features of these countries, where he had ample opportunities for studying the habits of birds both in a state of nature, and in confinement, the most advantageous means of procuring them, and the proper mode of feeding and maintaining them in health.

In order that the author may not be accused of the reproach of wearing "borrowed plumes," it is hereby candidly confessed that he has made a free use of the writings of Audubon, Nuttall, and particularly those of Dr. Bechstein, as well as of the "Boy's Treasury of Sports," without giving them, in numerous instances, such credit as the punctilious critic would seem to demand. Be this as it may, the author has endeavored not to deviate from established custom, except in cases where he deemed it expedient to change the language, in part, for the sake of brevity, elucidation, or *Americanising* the subject, or adapting it to our climate, economy, and social condition. Much of the matter, however, and several of the illustrations, he claims to be original.

The publisher, therefore, confidently presents the "American Bird Fancier" to the public with the full belief that it containes such information on the subject, as the taste and economy of our fair country women and their children require.

C. M. SAXTON.

NEW YORK, *March* 20, 1850.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INTRODUCTION

BIRDS, from their elegant and beautiful coloring, the graceful ease of their flight, their varied music, their tender solicitude for their young, their singular and engaging instincts, their susceptibility of domestication, and their subserviency to the sustenance of man, have, for ages past, attracted universal admiration, and, as objects of human interest, and even affection, they stand foremost, perhaps, in the entire range of animated nature.

The structure of birds and their habits of life, are wonderfully adapted to the various functions they are destined to perform. The pointed beak, the long and pliant neck, the gently-swelling shoulder, the expansive wings, the tapering tail, the light and bony feet, are all wisely calculated to assist and accelerate their motion through the yielding air. Every part of their frame is formed for lightness and buoyancy; their bodies are covered with a soft and delicate plumage, so disposed as to protect them from the intense cold of the atmosphere through which they pass; their wings are made of the lightest materials, and yet, the force with which they strike the air is so great, as to impel their bodies forward with astonishing rapidity, while the tail serves as a rudder to direct them to the different objects of their pursuit.

The internal structure of birds is no less wisely adapted to the same purposes. Their lungs have several openings, communicating with corresponding air bags, or cells, which fill the whole cavity of the body from the neck downwards, and into which the air passes and re-passes, in the process of breathing. This is not all; their very bones are hollowed out with the design of receiving air from the lungs, from which air pipes are conveyed to the most solid parts of the body, and even into the quills and plumelets of the feathers which are hollow or spongy for its reception. As all these hollow parts, as well as the cells, are only open on the side communicating with the lungs, the bird requires only to take in a full breath to fill and distend its whole body with air, which, in consequence of the considerable heat of its body, is rendered much lighter than the air of the atmosphere. By forcing this air out of the body again, the weight becomes so much increased, that birds of a large size can dart down from great heights in the air with astonishing rapidity.

This almost universal diffusion of air in the bodies of birds is of infinite use to them, not only in these long and laborious flights, but likewise in preventing their respiration from being stopped or interrupted by the rapidity of their motion through a resisting medium. Were it possible for man to move with the swiftness of a swallow, the actual resistance of the air as he is not provided with internal reservoirs similar to those of birds, would soon suffocate him

The digestive organs of birds form them into two distinct natural classes; those with cartilaginous stomachs, covered with very strong muscles, called a *gizzard*; and those with membranous stomachs more resembling those of carnivorous quadrupeds. The former is given to birds, the principal food of which is grain and seeds of various kinds, or other hard substances that require much friction to divide, or comminute, to assist which, gravel is necessary; the latter is given to birds which feed upon flesh or fish, and whose digestion is accelerated more by the gastric juice than by the action of the stomach. Those of the first class digest or retain every substance swallowed; and those which eject or disgorge innutritious matter unavoidably taken in, such as feathers, fur, bones, &c., belong to the second class, as is conspicuous in those that feed on fish. Graminivorous birds seem to possess the power of retaining the small stones taken into the gizzard, or evacuating them, when they become polished and less useful, but cannot disgorge them. In a state of nature, the quantity of gravel taken in, must be regulated, no doubt, by the sensation of the stomach; but, wonderful as it may seem, in domesticated animals, those instinctive faculties are deranged. Instances frequently occur where the whole cavity of the gizzard is filled with gravel stones. The food of graminivorous birds is conveyed entire into the first stomach, or craw, where it undergoes a partial dilution by a liquor secreted from the glands, and spread over its surface. It is then received into another species of stomach, where it is still further diluted, after which it is transmitted into the gizzard, or true stomach, consisting of two very strong muscles, externally covered with a tendinous substance, and lined with a thick membrane of prodigious power and strength, in which organ the food is completely triturated, and prepared for the operation of the gastric juices.

Graminivorous birds partake much of the nature and disposition of herbivorous quadrupeds, agreeing with them in the number of their stomachs, the quality of their food, and the gentleness of their manners. Content with the seeds of plants, with fruits, insects, and worms, their principal attention is directed to procuring food, hatching and rearing their offspring, and eluding the snares of men and the attacks of predaceous animals. The stomachs of carnivorous birds are smaller than those of the graminivorous kinds, and their intestines are much shorter. Many species of birds possess a reservoir for food, called a *craw*, or *crop*, which seems to answer the same purpose as the first stomach of ruminating animals. Here it is that the food is softened and prepared for the stomach, or carried to the young.

THE SONG OF BIRDS.

The song of birds is always, if not the expression of love, at least that of pleasure. Thus, the nightingale sings only as long as pairing time or hatching lasts, and is silent as soon as it is compelled to feed its young; whereas, the goldfinch and Canary sing throughout the year, and only cease when moulting dejects them. The continuation of the song of these birds, however, by no means proves that it is not occasioned by the stimulus of love.

Song appears to be the especial privilege of the male, whereby it either attracts the female or seeks to obtain her love; for there are but few females which produce notes similar to the song of the male, and these almost exclusively in a state of widowhood. They listen attentively, in fact, to the greater or less perfection or charm of the song of the male, to bestow upon that one their love whom they esteem the most accomplished singer. Thus, the most sprightly hen Canary selects the best singer; and the chaffinch, when at liberty, will choose from among a hundred males the one whose song best pleases her.

HABITATION OF CAGE OR CHAMBER BIRDS.

Birds which are kept only on account of their beauty, or for their animation and vivacity, are generally kept best in a room where they can run or fly freely about, and where they can resort at night for repose, to a large cage of many compartments, or to one or more fir trees. But larger birds should have an apartment expressly appropriated to them, as their fæces smell unpleasantly in a dwelling room, whence also they require constant cleaning. Smaller birds may be allowed to run freely about, having a small tree or a cage hung up for them to roost in. With this degree of liberty, many birds sing better than when confined in a cage.

Cleanliness is in every respect very important in keeping birds, for they are not only thereby preserved for many years but it keeps them constantly healthy and cheerful; hence it is necessary that the cage should be cleaned at least once a-week, and birds which run about upon the ground, should have the sand renewed frequently; the perches also of such as use them should be carefully cleaned. If this be not attended to, the birds will become sickly, and will suffer from lame feet, gout, and other maladies, terminating in the loss of their toes, as all must have experienced who have been accustomed to keep birds, and have neglected cleansing them. In cleaning their feet, it is very requisite that the bird should have them dipped in water before the dirt is removed; for if this be not done, the skin, to which the dirt closely adheres, comes off with it, which renders the bird not merely lame, but also attracts to the part all the unhealthy humors generated by their unnatural mode of living.

It is in the feet indeed that cage or chamber birds chiefly suffer, and they must be daily examined to see that nothing gets entangled about them, as hair thus twisted will frequently cut very deep, and in the course of a few days, that portion of the foot or toe, so tied up, will dry up and fall off. Very great attention must be paid to this particular circumstance, as scarcely a bird can be preserved for any length of time with all its toes uninjured. It is not to be denied, however, that many birds keep themselves exceedingly neat, whilst others, even of the same genus, are so uncleanly, that they are not only always soiling themselves, but never clean their feet, beak, nor wings.

Some bird fanciers take delight in making birds so tame as to be taken upon the hand into the open air, or to be allowed to fly away and come back again upon a call. "One of my friends," says Dr. Bechstein, "who has tamed birds as well as otters, adders, foxes, weasels, and martins, so that they would follow him upon a sign given, adopts the following easy and certain method to effect it:—When he wishes to accustom a bird to fly abroad, or to go out with him perched upon his finger or his shoulder, he first teases it with a soft feather in its cage which stands open. The bird soon snaps at the feather, and then at his finger, and it will then come out of the cage, and perch upon the extended finger; he immediately strokes it, and lays a few choice morsels before it. These, the bird will soon take out of the hand itself. He then commences by familiarising the bird with some peculiar call or whistle, and he carries it, as soon as it permits itself to be grasped in the hand, placed upon his hand or shoulder, from chamber to chamber, taking care to close the doors and windows; he then suffers it to fly, and calls it back again. As soon as it attends to this call without being scared or frightened, he takes it cautiously into the open air, and thus the bird becomes gradually so accustomed to him that he can carry it abroad or into company without its offering to fly away."

Care, however, must be taken not to carry adult birds, which have been thus tamed, into the open air where they can hear their fellows, in the spring or at pairing time, which are usually the periods when they show indications of resuming their native wildness.

If it is wished to teach a bird to eat out of the mouth, it must be kept for a time in the cage without food, and then when sitting upon the finger its favorite food must be held to it upon the tip of the exteded tongue. Hunger soon teaches it to peck. Such tame birds learn, also, speedily to sing upon the finger. To accomplish this, nothing more is necessary than to induce it by certain tones, motions, and fondling. But it is still further requisite to observe in this process of taming, that, to be effectual, it should be continued for a longer time than is here laid down. May we not presume that the bird will, in the course of a few weeks, do that freely which has been taught, or rather forced upon it, in this short space of time.

FOOD OF TAME BIRDS.

In selecting the food of birds in confinement, it is requisite to do so, as far as is practicable, in accordance with the nature of its food in a natural state. This, indeed, is frequently difficult, if not wholly impossible. Great caution, therefore, must be observed to accustom the birds we keep, or rather their stomachs, by degrees, to the food we are compelled to supply them, although it cannot be denied that there are birds, also, which, as soon as they are placed in the aviary, eat anything that is given to them. But others are more delicate, and will not eat at all, partly from grief at the loss of their liberty, and partly from not finding the food they have been accustomed to. Great care must therefore, be taken of these. If such as are known to be delicate—the majority of singing birds—for instance, commence greedily eating as soon as they are placed in the chamber, it is a bad sign; for they will certainly die, as it implies an unnatural indifference to the loss of their liberty, which is almost always deducible from sickliness. Those which creep into corners and seem for some hours to pine, it is less necessary to be anxious about; but they must not be disturbed until their ill-humor subsides.

Dr. Meyer, of Offenbach, Germany, remarks as follows upon this subject:—"An almost unfailing mode of accustoming birds to their food, which is known to be extremely difficult in many, is thus: Let the bird be placed in a cage in the room where it is purposed to be kept; give it freely appropriate food and drink in open vessels; leave it thus undisturbed for several hours; then catch it and dip it in fresh water, and again place it in its former cage. It will now sit for some moments thoroughly exhausted, but will soon recover and begin preening itself, and in the course of a few minutes become extremely animated, and then it will certainly eat the food put before it. Doubtless the same cause produces an appetite in birds after bathing as in man."

In order to give some general rules for the best food of cage or house birds, I have divided them, after Dr. Bechstein, into four following classes:—

The first comprehends those birds which live only on seeds, such as Canaries, goldfinches, Siskins, &c.

The second are those which feed both on seeds and insects, such as quails, larks, cat birds, and mocking birds; some of these also eat the buds and berries of trees.

The third are those which seek only berries and insects, such as nightingales, redbreasts, thrushes, and the like.

The fourth are those which eat insects only, such as wagtails, woodpeckers, cuckoos, &c.

The birds in the last-named class are the most difficult to preserve; but most of them, having nothing particular in their song, offer but little compensation for the trouble and care which they require.

Recipe for a General Food.—In proportion to the number of birds, white bread enough must be baked to last for three months. When it is well baked and stale, it must be put again into the oven, and left there until cold. It is then fit to be pounded in a mortar, and will keep several months without becoming bad. Every day a teaspoonful for each bird is taken of this meal, on which is poured three times as much cold, or lukewarm, (but not boiling,) milk. If the meal be good, a firm paste will be formed, which must be chopped very small on a board. This paste, which is very nourishing, may be kept a long time without becoming sour or sticky; on the contrary, it is always dry and brittle. As soon as a delicate bird is brought in, some flies or chopped worms should be mixed with the paste, which will attract it to eat. It will soon be accustomed to this food, which will keep it in life and health.

Although the notice of a universal remedy is generally suspicious, the two following sorts of paste have been recommended, and used with success, agreeing well with all, or nearly all, tamed birds, if we except those which are confined in cages on account of their beautiful songs. They are not only very simple and cheap, but also prevent great loss of time to those who possess a great number of birds.

Universal Paste.—To make the first paste, take a white loaf which is well baked and stale; put it into fresh water, and leave it there until quite soaked through; then squeeze out the water and pour boiled milk over the loaf, adding about two thirds the quantity of barley meal with the bran well sifted out, or, what is still better, wheat meal.

For the second paste, grate a carrot very nicely (this root may be kept nearly a whole year if buried in sand); then soak a small white loaf in fresh water, press the water out, and put it and the grated carrot into an earthen pan; add two handfuls of barley or wheat meal, and mix the whole well together with a pestle.

These pastes should be made fresh every morning, as they soon become sour, particularly the first, and consequently hurtful.

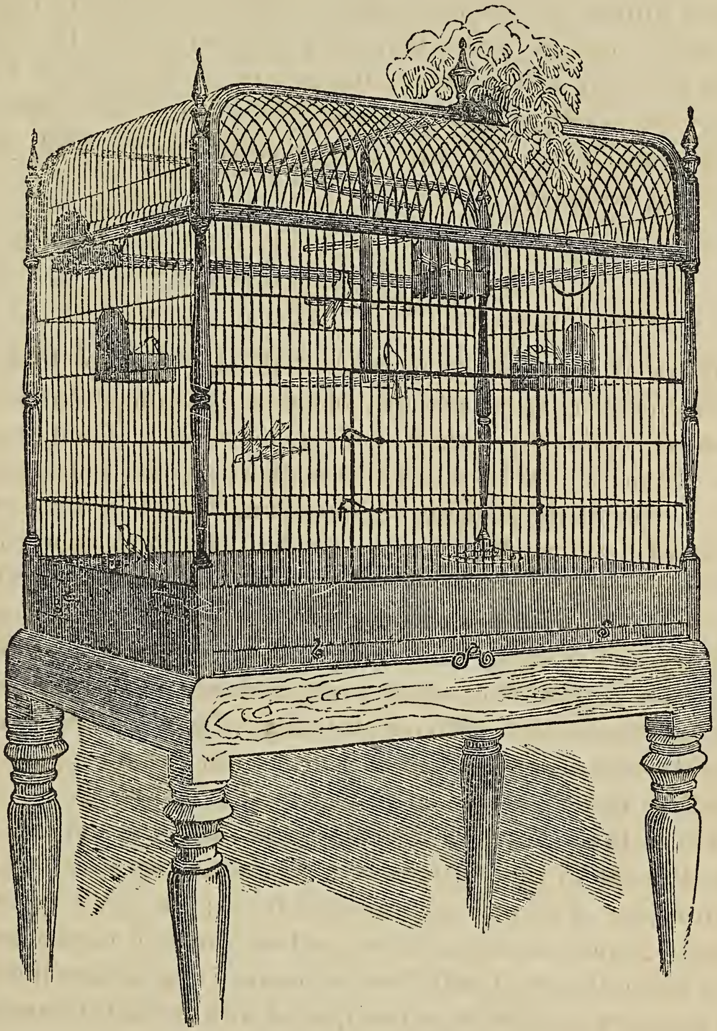
Every morning, fresh water must be given to the birds, both for drinking and bathing. When a great many are left at liberty, one dish will do for them all, about eight inches long, and two in width and depth, divided into several partitions, by which means they are prevented from plunging entirely into the water, and in consequence making the place always dirty and damp. A vessel of the same size and shape will do for holding the universal paste, but then it must have no partitions.

Those birds which devour everything thrown to them, must be protected against the possibility of having any food given to them that contains pepper or much salt, and especially against putrid meat. This is a universal rule of precaution. It may further be observed, that to birds confined in cages, no more must be given than they can eat during the day otherwise they will accustom themselves to scatter their food out of the vessel, and eat the best first, leaving the worst for subsequent fare; and are consequently to-day well, and drooping to-morrow.

BREEDING.

There is but little to be said of the breeding of birds in confinement, as, in the majority of cases, it is difficult to accomplish, excepting in such as can be thoroughly familiarised, like Canaries. Of breeding places, there are two kinds, one a large cage made of wire or wood, and the other the entire range of a room. Both should be dry, airy, and exposed in our northern climate to the warmth and light of the sun. It is chiefly requisite to supply birds that are to breed with a still, solitary, and spacious abode; and it is preferable to give them an entire apartment in which evergreens are placed that have not lost their leaves. Above all things, it is desirable to make this abode as nearly resemble their natural dwelling place as possible, that they may be excited to pair. With every care, however, to render their breeding place like the natural one, it is difficult to supply them with the necessary materials for their nests. This deficiency should be supplied by nests artificially formed of woven cotton, willow, straw, or turned wood, into which they will only have to convey appropriate linings; for this purpose, they must be supplied with the hair of animals and raw silk, cotton, wool, &c.

Especial care must be taken to furnish the birds with requisite food, which partly contributes to fit old ones for breeding, and which must also be suited to the varying ages of the reared young. In this particular, I shall mention what must be done, in the articles relating to the different species described in the subsequent part of this work.



BREEDING CAGE

TIME FOR REMOVING WILD BIRDS FROM THE NEST.

It may be necessary that I should give some general directions about the time at which it is desirable to remove young wild birds, intended to be reared, from the nest. This is when the tail quills shoot forth, and when all the feathers begin to expand, and before the birds can yet completely open their eyes. If they are removed earlier, their stomachs are too weak to endure the food of the aviary, and if it take place later, it is usually extremely difficult to induce them to open their beaks to receive food with which they are unacquainted. But there are species of birds which can at all times be easily fed and tamed. As a general rule, all seed-eating birds may be tamed, both adult and young.

DISEASES OF TAME BIRDS.

Like all tame animals, birds that are kept in confinement, are exposed to more maladies than those which live at large;* and especially as they are frequently so closely confined in cages that they have scarcely room to move. These maladies, however, are considerably increased by their having all kinds of delicacies, as pastry, sugar, &c., given them, which spoil their stomachs and usually produce a slow consumption.

The following are the chief maladies which affect birds, and their remedies, as laid down by Dr. Bechstein, the efficiency of which he proved upon his own. Indeed, the variety of birds, as well as the variety of their food, requires also a difference of treatment in their maladies; and in speaking of each species, I shall have occasion to notice how their peculiar diseases may be treated, when the general remedies are not suitable to their nature.

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* It has been frequently asserted that birds in their natural state are never ill, but this is unfounded.

Pip, or Thrush.—This is a catarrh, or cold, by which the nostrils are stopped up, and the membrane covering the tongue is hardened by inflammation. In large birds, it is common to remove this skin, taking it off from the base to the tip; but rough modes should not be used for doing it. A little borax, dissolved in water, may be applied to the tongue with a camel-hair pencil two or three times a-day until a healthy action is produced. By this means, this part can again perspire, the saliva necessary for digestion can flow, and the taste and appetite return. A mixture of fresh butter, pepper, and garlic, generally cures this catarrh. It is a good thing, also, for the birds to drink the pectoral infusion of speedwell (*Veronica officinalis*); and the nostrils may be opened by passing up a small feather dipped in oil. The ruffling of the head, the beak often open and yellow at its base, and the tongue dry, are the most decisive indications of this disease.

Rheum.—The symptoms of this disease are frequent sneezing and shaking of the head. Some drops of pectoral elixir in the infusion of speedwell, which the sick birds must be made to take, appears to be the most efficacious remedy.

When it is merely hoarseness, Dr. Handel, of Mentz, in France, gave to his birds for several days, as their only drink, a very dilute decoction of dry figs, sweetened with a little sugar, and afterwards purged them, for two days following, with the juice of carrots.

Asthma.—This is a very common disease among house birds. Those attacked with it have their breath short, often open their beaks as if to gasp for more air, and, when agitated or frightened, keep them open for a long time.

The cause of this disease may doubtless be found in the mode of life which the birds lead. Their food is generally too dry and heating, being principally hemp seed, which is very injurious, but liked by all; and is the more hurtful, as it inclines them to eat too much. If to this, be added the unchanged air of the rooms, particularly those which have stoves instead of chimneys, and the great heat which is kept up during winter, it is plain that there is much to injure the delicate lungs of the birds.

A moist and refreshing regimen and some aperients, more or less often, according to the violence of the disease, appears the most appropriate remedy. A favorite linnet and goldfinch, mentioned by Dr. Bechstein, when attacked with very bad asthma, were relieved and preserved for several years by the following method:—

The first thing was to leave off hemp seed entirely, confining them solely to rape seed; but giving them at the same time an abundance of bread, soaked in pure water, and then pressed; lettuce, endive, or water cresses, according to the season, twice a-week, giving them bread boiled in milk, about the size of a nutmeg. This is made by throwing a piece of the crumb of white bread, about the size of a nut, into a teacupful of milk, boiling it, and stirring it all the time with a wooden spoon till it is of the consistency of pap. It must be quite cold before it is given to the birds, and must always be made fresh, for if sour, it will prove injurious.

This paste, which they are very fond of, purges them sufficiently, and sensibly relieves them. In very violent attacks, nothing but this paste ought to be given for two or three days following, and this will soon give the desired relief.

When the disease is slight, or only begun, it is sufficient to give the bread and milk once in three or four days. When employed under similar circumstances, this treatment has cured several very valuable birds. It may not be useless here to renew the advice of always giving the birds an opportunity of bathing every day, by putting in their way a saucer, or any other small shallow bath, filled with water, which should never be too cold, and in winter always milkwarm.

One thing which is very injurious to the lungs of birds, and which too often occurs, is the fright occasioned by tormenting them, or by seizing them too suddenly; for the poor little things often rupture a blood vessel in the breast while beating themselves about. A drop of blood in the beak is the sign, and a speedy death is the general consequence. If this do not happen, the breathing is not the less difficult and painful; and recovery is rare, at least without the greatest care and attention.

Birds that eat insects and worms, occasionally, by accident, swallow some extraneous substance, which, sticking in their throat, stops their respiration and stifles them. The only remedy is to extract the foreign body, which requires much skill and dexterity.

When asthma is brought on by eating seeds, which are too old, spoiled, or rancid, Dr. Handel recommends some drops of oxymel, (honey and vinegar boiled to a syrup,) to be swallowed for eight days following. But the best way is to change the seed, and be sure there is none but good seed in the feeding trough.

Atrophy, or Wasting.—This is caused by giving unnatural food to the bird, which destroys the digestive power of its stomach. In this case, it disgorges its food, ruffles its feathers, and does not arrange them, and becomes thin very fast. The best thing is to make it swallow a common spider, which purges it, and put a rusty nail into its water, which strengthens the tone of the stomach, giving it at the same time its proper and natural food. Green food, such as lettuce, endive, chickweed, and particularly water cresses, is the safest remedy. A very great appetite is a sign of this disease. A Siskin, mentioned by Dr. Bechstein, that was dying of atrophy, had nothing but water cresses for three days following, and on the fourth he sung.

Consumption.—This is usually the result of unnatural food, which interrupts the function of digestion, and it is recognised by the bird inflating and distending itself. The feathers are ruffled, and the flesh dwindles. No better remedy, perhaps, can be found than to give such birds a common spider, which purges them, and to lay in their water a rusty nail, which strengthens the stomach. They must, at the same time, be fed with the best description of their appropriate food. In birds which will eat vegetables, and especially water cresses, this will be found the surest remedy against consumption, or waste. Usually, birds suffering from this malady have a voracious appetite for green food. Dr. Bechstein fed a Siskin, which had already completely wasted, for three successive days, with nothing but water cresses, and on the fourth it recommenced singing.

Costiveness.—This disease may be discovered from the frequent unsuccessful endeavors of the bird to relieve itself. Aperients will be of use. If a spider does not produce the desired effect, anoint the vent of the bird with the head of a pin steeped in linseed oil; this sort of clyster generally succeeds. Boiled bread and milk is also of great service.

Diarrhœa.—This is a disease to which birds that have been caught recently are very subject, before they are accustomed to their new food. Most of these die of it; they continually void a white calcareous matter, which sticks to the feathers round the vent, and being very acrid causes inflammation in that part and in the intestines. Sometimes chalybeate water, (iron water,) and the oil clyster produce good effects; but it is better, if possible, to procure for the bird its most natural food. Some people pull out the feathers from the tail and vent, and then rub these parts with fresh butter, but this is a very painful and cruel operation. They also mix the yolk of an egg boiled very hard with their food, but this does not succeed very well. If there be any hope of curing this disease, it is by attacking it at the beginning, before inflammation is violent; boiled bread and milk, a plenty of lettuce, or any other similar green refreshing food, generally effects a cure.

In a case of chronic diarrhœa, which almost reduces the birds to skeletons, Dr. Handel, of France, prescribes chalybeate water, mixed with a little milk for their drink, which, he says, is an easy and certain cure.

Bloody Flux.—This is a disease with which some parrots are attacked. The best remedy is to make the birds drink a plenty of boiled milk, or even very fat broth; for their intestines, which are very much irritated, require something soothing to protect them from the acrid discharges, which, at the same time, must by corrected be healing food. Birds in this state, generally do nothing but drink; therefore plenty of boiled milk should be given them, as it nourishes them, as well as acts medicinally, but should it appear to turn sour in the stomach, it must, at least for some time, be discontinued.

Obstruction of the Rump Gland.—This gland, which is on the rump, and contains the oil employed for anointing the feathers, sometimes becomes hard and inflamed, and an abscess forms there. In this case, the bird often pierces it itself, or it may be softened by applying fresh butter without any salt; but it is better to use an ointment made of white lead, litharge, wax, and olive oil, which may be had of any good chemist or apothecary. The general method is to pierce or cut the hardened gland, in order to let out the matter.

The gland is known to be obstructed when the feathers, which surround it, are ruffled, the bird never ceasing to peck them, and instead of being yellow it becomes brown. Dr. Bechstein says, this disease is very rare among wild birds, for, being exposed to damp, and bathing often, they make more use of the liquor in the gland, consequently, it does not accumulate sufficiently to become corrupted, sour, or cancerous. This confirms the necessity of giving them the means of bathing as often as instinct would induce them, as nothing can be more favorable to their health.

Dr. Handel, after piercing the gland, recommends a little magnesia to be mixed with the bird's drink.

Epilepsy.—This is a disease with which house birds are very often attacked. What has been found to be most useful in this case, is to plunge the sick birds every now and then into very cold water, letting them fall suddenly into it, and cutting their claws, or at least one or two, short enough for the blood to run.

From bleeding giving so much relief, one would think that this disease is a kind of apoplexy, occasioned by want of exercise and too much food. Bullfinches and thrushes are more subject to it than any other birds, and bleeding always cures them, which has been done with great success in the following manner, but much delicacy and skill are required, as there would be great danger of laming the bird:—A very small hole is made on the surface of the claw, with a lancet or very sharp penknife; it is then plunged in lukewarm water, and if the operation be well done, the blood runs like a thread of red silk; when removed from the water, the bleeding stops; no bandage nor dressing is required.

Tympany, or Bloating.—In this disorder, the skin on one part of the body, or even the whole body, rises and swells to so great a degree that it is stretched like a drum. It is generally sufficient to pierce it with a pin, so as to let the air escape, and the bird will be cured.

Disease in the Feet.—House birds are often subject to bad feet. From the second year, they become pale, and lose their freshness. They must be frequently cleaned, taking care to remove the skin; the thick loose scales ought also to be taken off, but with all possible precaution.

The gout occasions the feet to swell; they are also so scaly and painful that the poor little bird cannot support itself without resting on the points of its wings. Dr. Handel prescribes a warm fomentation with a decoction of soapwort (*Saponaria officinalis*). If a foot should be bruised or broken, he advises that the diseased bird should be shut up in a very small cage, the bottom of which is very smooth and even, without any perches, or anything which would tempt it to hop, and put in a very quiet and solitary place, out of the way of anything which might produce agitation. In this manner, the bird will cure itself in a little time, without any bandage or plaster of any kind.

Dr. Bechstein was of the opinion that the principal cause of bad feet is want of bathing. The scales, contracting from dryness, occasion great pain; in order to remove them with ease, and without danger, the feet must be softened in lukewarm water. The following method has been used with a bullfinch with success:—Its cage was made with a movable tin bottom, which, being half or three quarters of an inch deep, could hold water, that was put in tepid, to bathe the bird;

the perches were then removed, so that the bird was obliged to remain in the water, where it was left for half an hour, sometimes throwing it hemp seed to amuse it. After repeating the bath once or twice, the bird became very fond of it; and it was remarked that its feet became, if we may say so, quite young again. The scales being sufficiently softened, the middle of each was cut lengthwise without reaching the flesh; this made the sides easily fall off. It is better to remove only two scales a-day, that the bird may not be wearied. By continuing the bath three times a-week, the feet become healthy and supple, and the bird is easy.

Sore Eyes.—The juice of red beet for drink, and also as a liniment, greatly relieves this disorder. Dr. Handel, of Mentz, recommends washing the eyes, when disposed to blindness, with an infusion of the root of white hellebore.

Tumors and Ulcers.—As to the tumors and ulcers which come on the heads of the birds, Dr. Handel touches them with a middling-sized red-hot knitting needle. This makes the watery humor run out, and the wound afterwards dries and heals. To soften the pain, a little liquid black soap is used. If, from the softness of the tumor, matter seems to have formed, it should be rubbed with fresh butter until it is come to a head; it may then be emptied, and opened by a few drops of essence of myrrh. During all this time, the bird must have nothing but beet juice to drink.

Ulcers in the palate and throat may be cured by making the bird drink the milk of almonds for several days, at the same time lightly touching the ulcers several times a-day with a feather dipped in a mixture of honey and borax.

Moulting.—This occurrence, though natural, is generally accompanied with disease, during which the birds ought to be taken great care of. Their food should be changed, but without giving any heating delicacies, which are very injurious.

It has been observed that birds always moult at tne time when their food is most abundant; the forest birds may then be seen approaching fields and cultivated places, where, having plenty of insects and seeds, they cannot suffer from want;

indeed, the loss of their feathers prevents their taking long flights, and the reproduction of them occasions a loss of flesh which must be repaired. An abundance of food is therefore necessary, and, following this rule, during moulting, some additional food must be given to house birds, appropriate to the different species—millet or Canary seed, a little hemp seed, white bread soaked in water, and lettuce, or endive, to those which feed on seeds; with a few more worms and ants' eggs to those that eat insects; all should have bread soaked in boiled milk, warmth, and baths. Nothing has succeeded better than this regimen.

Vertigo, or Giddiness.—This, without being properly a disease, is rather common, and is occasioned by the trick which the birds of the first class have, of turning their head and neck so far round that they fall off their perch. They may be easily cured of this trick by throwing a covering over the top of the cage, which prevents their seeing anything above them, for it is with looking up that this *giddiness* comes on.

Pairing Fever.—A disease which may be called the "pairing fever" must not be forgotten here. House birds are usually attacked with it in the spring, or at the time when the inclination to pair is greatest. They cease to sing, become sorrowful and thin, ruffle their feathers, and die. This fever generally first seizes those which are confined in cages; it appears to arise from their mode of life, which is too uniform and wearying. They may be cured merely by placing them in the window, where they are soon so much refreshed that they forget their grief, their desire for liberty, or for pairing, and resume their liveliness and song.

It has been observed that a single female in the room is sufficient to cause this disease to all the males of the same family, though of different species. Removing the female will cure them directly. The males and females, at this season, must be separated, so that they cannot see nor hear one another. This, perhaps, is the reason that a male, when put in the window, is soon cured.

Parasitic Vermin.—If birds are sometimes restless, especially of a night, and if they are observed to be frequently feeling with their beaks about the abdomen, back, or wings, they must be examined to see if no small yellow insects, (lice or mites,) may be discovered upon the body, or between the feathers. If this be the case, they must be sprinkled by means of a small syringe with water, in which quicksilver has been steeped, or with a much diluted infusion of tobacco, for several successive days, whereby these vermin are destroyed or chased away. Another mode of getting rid of the lice is to bathe the birds frequently, and to give them, daily, fresh or dry sand, and to be very particular in keeping them exceedingly clean.

Unnatural Fatness.—If it be found that the birds become unnaturally fat, which is often the case, especially during autumn, in some species of warblers, their too nutritious food must be changed and Swedish turnips, (ruta-bagas,) be mixed in it, and dry ants' eggs put into their drink, which much checks their corpulency.

THE CANARY BIRD.

Synonymes.

Fringilla canaria,	Of Ornithologists.
Serin de Canarie,	Of the French.
Canarienvogel,	Of the Germans.
Canario,	Of the Spaniards and Portuguese.
Canarino,	Of the Italians.
Canary Bird, Canary,	Of the British and Anglo-Americans.

THE Canary bird, from its beautiful plumage, elegant shape, singular capacity, and attractive familiarity, as well as from the charms and melodies with which it enlivens our rooms, has always been agreeable to the fancier, and may, emphatically be called the *real* "cage bird." Some of them we find melancholy, others cheerful; some angry, others peaceful; some intelligent, others dull; some industrious, others idle; some greedy, others frugal. But they have chiefly made themselves beloved by their animated, powerful, and varied song, which lasts almost throughout the whole year, and with some even during the time of moulting.

These birds are also distinguished by their correctness of ear, the remarkable skill they possess of imitating all tones, and their excellent memory. Not only do they imitate the notes of other birds, which they greatly improve by mixing them with their own, but they will even learn to utter short words with some degree of correctness. In their wild and undomesticated state, their song is unvaried, as with most other birds, less melodious, of fewer notes, and uttered at longer intervals than with us; at least, I found them so, as far as my observation extended, when a resident of the Canary Isles.

ORIGIN AND HISTORY.

Those birds, from which are descended the Canaries now kept and reared throughout the whole of Europe, and even in Russia and Siberia, as well as in various parts of North and South America, in an unadulterated state, are natives of the Canary Islands, where they breed in pleasant valleys, and on the delightful banks of small rills, or streams. They were known in Europe as long ago as the beginning of the sixteenth century, as we are told, concerning their arrival, that, "A ship, which, in addition to other merchandize, had a multitude of Canaries on board, that were consigned to Leghorn, was wrecked on the coast of Italy, and the birds, thereby obtaining their liberty, flew to the nearest land." This happened to be Elba, where they found so propitious a climate, that they multiplied without the intervention of man, and probably would have naturalised themselves, had not the wish to possess them been so great as to occasion them to be hunted after until they were entirely extirpated. In Italy, therefore, we find the first tame Canaries, where they are still raised in great numbers. At first, their rearing in Europe was attended with considerable difficulty, partly because the mode of treating these delicate strangers was not sufficiently understood, but principally because males, chiefly, and not females, were introduced.

DESCRIPTION.

The Canary bird is five inches in length, of which the tail comprises two inches and a quarter; the beak is five lines long, stout, sharply pointed, and whitish; the legs are flesh-colored, and eight lines high. The female is scarcely to be distinguished from the male, but the latter has generally deeper and brighter colors; the head is rather thicker; the body, in general, more slender throughout; and the temples and the

CANARIES AND NEST.

space around the eyes, are always of a brighter yellow than the rest of the body.

The original grey color of this bird, which merges into green beneath, has, by means of domestication, climate, and intermixture with other birds, become so multifarious, that Canaries may now be met with of almost every hue; but grey, yellow, white, blackish and reddish-brown, are the prevailing colors, which are individually seen in every degree of shade, or combination, and thus present innumerable differences. Those which are of a blackish-grey, or greyish-brown, above, with greenish-yellow beneath, like a greenfinch, are the most common, generally the strongest, and approach the most closely to the original color of their primogenitors. The yellow and white ones have usually red eyes, but are more delicate. The chestnut-colored are the most rare, and in strength and length of life are intermediate. The colors of most Canaries consist of a mixture of these, and that bird is the most prized the more regularly it exhibits the combination of these various shades. That which is most generally admired, at present, is one with yellow, or white, upon the body, and of a dun-yellow color on the wings, head, and tail. Next in degree of beauty, is that which is of a golden yellow, with a black, blue, or blackish-grey head, and similar wings and tail. There are also blackish or grey ones, with yellow heads, or with a ring about the neck, white, with brown and black markings, ashy-grey, almost black, with a yellew breast, and white head and tail, all of which have a prominent value. Others, which are irregularly marked, and are variegated, or mottled, are less esteemed.

HYBRIDITY.

As remarked in a preceding page, the original color of the Canary bird is grey, which merges into green beneath, almost resembling the colors of the linnet; but by means of domestication, climate, and intermixture with other birds, as the citril finch and serin, of Italy, and with the Siskin and linnet, of Germany, they have become so multifarious, that they are to be met with of almost every color and hue. Furthermore, in Europe, there are societies for promoting the breeds, and premiums are awarded to competitors who come nearest to the model of perfection given out for competition. The hybrids produced by crossing the Canary with other birds, most in favor, may be described as follows:—

1. *The Cross between the Canary and Goldfinch.*—The colors of this variety consist of a very beautiful intermixture of those of both parents. One which has been highly prized, was marked in the middle of the crest with ashy-grey; the rest of the head, and the upper part of the neck, was of a silvery white, with a bright orange-red ring round the base of the beak, and another ring of snowy whiteness round the neck; the back was greyish-brown, striped with black; the rump, white; the under part of the body, snow-white; the vent, the wings, and the first pinion feathers, were also white; the rest, as well as the coverts, black, edged with yellow, and with a golden-yellow spot in the centre of the wings; the tail was white, with a black lateral spot; the beak and feet, white, the former with a black tip. The mother of this fine bird was white, with a greenish crest. In general, the handsomest varieties are produced when yellow or white Canaries are pared with goldfinches.

2. *The Cross between the Canary and the Siskin.*—This is perfectly like the female Siskin, if the male bird is a green Canary, but if the latter be white or yellow, it becomes rather brighter and always retains the color and figure of the Siskin.

3. *The Cross between the Canary and the Serin* is distinguished only by its smaller size, and by its short, thick, beak, from the common grey or green Canary, unless produced by a white or yellow hen.

The Cross between the Canary and the Linnet.—When the offspring of a grey Canary, its only difference is a slightly longer tail; but it is variegated or speckled when the Canary is yellow or white.

PAIRING AND LAYING.

In order to obtain birds of a brilliant plumage, it is requisite to pair together such as are of similar markings, and the colors of which are regular and distinct. This is best effected in separate breeding cages. Variegated and checkered ones are often produced in aviaries where the birds pair together indiscriminately. Those of a greenish and brownish color, paired with bright-yellow ones, often produce beautiful dusky-white, or other favorite colors. A requisite precaution to be observed is, that a tufted and a smooth-headed bird should be paired together; for, if two crested ones be placed with one another, a part of the head of their progeny will be bald, or otherwise deformed.

Some males are always dejected, sing but little, are indifferent to their mates, and consequently unfit for breeding; others are too choleric, incessantly snap at, and chase about, the females, and indeed, often kill them and their young; others, again, are too ardent, persecute the female while she is sitting, tear the nest, throw out the eggs, or continually excite her to pair, until she quits her eggs or neglects her young; others, in breeding time, sing so incessantly, and so powerfully, that they rupture the small vessels of the lungs, and suddenly drop dead in the midst of their song.

The females have also their defects. Some merely lay, and immediately quit their eggs as soon as laid; others feed their young badly, bite them, or pluck out their feathers; others lay with much exertion and labor, and when they should hatch become sickly, or lay again after a long interval.

Those birds which are to be paired for the first time, should be placed together in a small cage or an open room for a week or ten days, to be wonted to one another. If two females are to be paired with one male, they must previously be accustomed to each other's society by being also kept together in a small cage; and the breeding cage should have two compartments, separated by a board, in which a sliding door has been made. In one compartment, a lively male may be enclosed with a female. About the cage or room, there should be placed some flax, soft hay, wool, hog's bristles, cow's hair, moss, pieces of thread, cut about a finger's length, paper, shavings, or other dry materials for building the nest, which usually occupies three days. When one female has laid eggs, the sliding door may be moved and the male admitted to the other female; and when they have both laid, this door may be kept open. The male will visit both females alternately, when they will not trouble themselves about each other; otherwise, without this precaution, jealousy would incite them to destroy each other's nests and throw out the eggs. In a room or aviary, a male has sometimes two and even three females placed with him; with one of these, he will more especially pair. But when this favorite is about to sit, the others will receive a share of his attentions, and from the latter usually the greatest number and the best birds are reared.

CANARY BREEDING CAGE.

The female, as with the majority of birds, is usually the architect, the male only selecting the place and procuring materials, the coarser of which is used for the external structure, and the finer for lining the inside of the nest. The females will sometimes show indications of their instinct by building nests after their own fashion, generally being irregular in figure, and not nicely finished, at least externally. It is in the nest itself, where the pairing takes place, the female attracting the male by a continuous piping note, repeated more quickly the nearer she is to laying. An interval of seven or eight days elapses between the first pairing and laying the first egg. Every day afterwards, nearly at the same hour, an egg is laid, the number varying from two to six.

BREEDING, INCUBATION, ETC.

The month of March is the best time to place the birds in the breeding cage. Of these, there are two kinds, either a large one, made of wire, as is shown at page 15, in which it is better to place a male, and one female, than one male and two females together, like the one shown in the preceding page; or the birds may have range of an entire room. All breeding places must be exposed to the warmth and light of the sun, and be hung about with nests made of turned wood, tin, or little wicker baskets, two for each pair.

When a room is allotted to the purpose, it ought to contain shrubs for the birds to perch or build upon, with a plenty of fresh water to drink and bathe in, that being indispensable for all birds. The light should be admitted into the east or southeast, for the benefit of the morning sun, and the windows should have wire cloth over them, that the birds may enjoy the fresh air. The floor of the apartment should be strewed with clean gravel or sand, on which should be thrown celery or chickweed; but when breeding, they should have nothing except hard-chopped eggs, dried roll, cake without salt, and once in two or three days a few poppy seeds.

When the birds are good breeders, it is needless to attempt to assist nature by artificial means; and it is best to leave the them entirely to themselves. In other cases, it is customary to remove the first egg and replace it by an ivory one, placing it in a box filled with clean, dry sand, and so taking away all the eggs till the last one is laid; all are then returned to the nest to be hatched. They often lay three or four times a-year, from February to September, and some are so assiduous in pairing, that even moulting does not interrupt them. The eggs are of a sea-green color, marked on one end with reddish-brown or violet spots or stripes. The period of incubation lasts thirteen days.

If, from the sickliness of the male, or of the female, any of the eggs are unimpregnated, they must be taken out of the nest when the hen has sat for a week or ten days, held lightly between the fingers in the sunshine, or in a bright light; the fecundated ones will then appear filled with veins, while the bad ones will be quite clear, or already addled, the latter of which must be thrown away. The male rarely relieves the female in hatching, nor does she very willingly permit it. Immediately after feeding, she returns to the eggs, and should the male perchance be on the nest at the time, if he should not directly quit, he would speedily be compelled to do so by pecks and blows. The young are occasionally killed in the egg, in consequence of loud and near noises, such as heavy thunder, the discharge of fire arms, violently slamming the door, or any other very loud knocking.

FEEDING AND REARING THE YOUNG.

As soon as the young are hatched, the old birds should be supplied with one fourth of a hard-boiled egg, minced very fine, with some dried roll, or bread, containing no salt, steeped in water, the latter of which should be squeezed or pressed out again. In another vessel, some boiled rape seed should be placed, which has been rewashed in fresh water, to take away the acidity. Some use crackers instead of bread, but this is unnecessary. It is merely requisite to see that this soft food does not become sour, otherwise it will kill the young, and the cause remain unsuspected. Some persons merely give them their usual food, intermixing it with some finely-powdered crackers and hard-boiled eggs, but it has been found by experience, that the diet prescribed above is more efficacious, especially until the young are fledged.

It is now that the male takes the chief part in rearing the young; and upon him devolves the duty of feeding them, in order to allow the female to recover from the exhaustion she has received from incubation.

If it is necessary to feed the young by hand, grated roll or pulverised dry crackers is taken, mixed with pounded rape seed, and kept in a box. As often as it is necessary to feed them, a little of it is moistened with some of the yolk of an egg and water, and given to them from a quill pen. This must be done ten or twelve times a-day; about four penfuls is the quantity necessary for each meal.

Up to the twelfth day, the young remain almost naked, and require to be covered by the female; but after the thirteenth, they will feed themselves. In cold, dry years, however, it sometimes happens that the birds get scarcely any plumage at all. When they are a month old, they may be removed from the breeding cage. With the usual food of the old birds, they must be fed for some time upon the kinds above named; for, the sudden removal from soft food often occasions death, especially in moulting. It is asserted, and not without reason, that those Canaries which are reared in an arbor, where they have space to fly about within an enclosure of wire, are longer-lived and stronger than those which are reared in a chamber or a confined cage.

It is a curious fact, perhaps not known to every one, that, when there are two females with one male in a cage, and one dies, the other, if she has not already sat, will hatch the eggs laid by her co-mate, and rear the young as her own; and, during this foster-mother care, cautiously avoid the caresses of the male!

TO TEACH A YOUNG CANARY TO SING.

When the young birds can eat alone, say at the age of thirteen or fourteen days, and often before quitting the nest, the males commence warbling, and the females, also, but less connectedly and from this, the sexes may be distinguished. To teach a young Canary to sing, he must now be separated from his comrades, as well as from other birds, and placed in a small wire cage, which, at the commencement, must be covered with linen, and subsequently, by degrees, with thicker woollen cloth, when a short air, or other musical piece, must be whistled to him, or a flute, or a small organ may be used. This lesson should be repeated five or six times a-day, especially mornings and evenings, and in five or six months, he will be able to acquire the air, according to the power of his memory.

FOOD AND MANAGEMENT OF ADULT BIRDS.

Except during the breeding season, the males may be kept in cages either bell-shaped or like that denoted in the adjoining cut. These may be made of wire or rattan, and should be at least a foot high and eight inches in diameter, with one or more transverse perches.

The female is allowed either to have freedom in the room with her wings clipped, or is placed in a large breeding cage, possessing sufficient space to keep her limbs in constant exercise, and preserve them in health and strength.

In the bell-shaped, or smaller cages, wherein it must be understood only one male should be put, both the eating and drinking vessels must be placed on the outside, at the extremities of the lower perch. These should be surrounded by a cap of tin, so that the bird may not easily scatter its food. Cleanliness will often prevent these delicate songsters from suffering many disorders, and it is very desirable that the floor of the cage should be made movable, that it may be more easily cleansed and strewed with coarse sand.

Being naturally inhabitants of a warm climate, and rendered delicate by constant residence in rooms, and so, in a manner habituated to a temperature similar to that of their own country, great care is necessary in winter, in order that the same or a similar temperature may be preserved, avoiding the exposure to cold air, which, however, refreshes in summer, cannot be otherwise than prejudicial to them, causing sickness and even death. To keep these birds in a healthy and happy frame, it is very important to observe that, in summer, they be frequently hung in a cage in brilliant daylight, and if possible, placed in the warm sunshine, which, especially when bathing, is very agreeable to them.

CANARY BIRD CAGE.

The most important consideration in the management of the male is his food. The more simple and true to nature this is, the better does it agree with him; whereas, when too artificially compounded, it renders him sickly and weak. The best food is the "summer rape seed," which is sown in spring. This is distinguished from the "winter rape seed," which is sown in autumn, by being larger and of a darker hue. On this diet, these birds thrive very well, but it should be occasionally intermixed with some crushed hemp seed and Canary seed, for the sake of flavoring it; and this more especially in the spring, when they are intended for breeding. As a treat, we may occasionally give them a mixture of summer cabbage seed, whole oats or oatmeal, with millet, or some Canary seed. Here, as in most other cases, we should strive to imitate nature.

The hen Canaries may likewise be supplied with the same kind of food as the males; but in winter, they are content with bread, containing no salt, or merely barley grots, moistened in milk, if given to them fresh every day, without being sour. Besides, both males and females may be given, in summer, some green lettuce, cabbage, groundsel, and water cresses, which must be previously washed and cleansed from anything prejudicial; and in winter, they may be fed with pieces of sweet apples. They require fresh water daily, both for drinking and bathing; and at moulting time, a rusty nail should be occasionally placed in their drinking vessel, as this tends to strengthen the stomach.

TO TEACH THE ADULT BIRDS TO FLY.

CANARIES may be taught to fly; but the trouble and risk are so great that it is hardly worth the time and care necessary to teach them. The male is first allowed its liberty in a place where there are trees, and the female is hung at a window, near by, which speedily attracts him back to the cage in case of danger or fatigue. This teaching must be continued for five or six days, but no handling nor violent attempts to catch them should be used.

DISEASES.

The Canary bird, in a state of captivity, seldom enjoying the open air and having but little exercise, is subject to most of the maladies peculiar to the domestic, feathered race. The diseases to which it is particularly liable, may be described and treated as follows:—

1. *Rupture.*—This is a common malady, especially in young birds, and is a kind of indigestion which causes inflammation of the intestines. The symptoms of this disease are a lean, transparent, blown-up body, full of small red veins, and in which all the intestines seem to have fallen to the lower part of the body, where they become entangled and turned black. Too much nutritious food is the cause of this evil. All remedies appear to have been ineffectual in this malady, but assistance is sometimes obtained from a spare and simple diet.

2. *The Yellow Gall in the Head and Eyes* may be cured by refreshing food; but if there be a tubercle of the size of a hemp seed about the head or eyes, it must be cut off, and the wound anointed with fresh butter.

3. *Sweating.*—Some females, whilst hatching, have a sweating sickness, which is injurious to the blood, and may be detected by the feathers of the lower part of the body being quite wet. The body of the bird should be washed with brine, and afterwards with rain or spring water to free the feathers of salt, and then rapidly dried by the sun or fire. This may be repeated once or twice a-day. This sickness, however, is not so prejudicial to the bird as is generally supposed.

4. *Sneezing.*—This is occasioned by a stoppage of the nostrils, and may be removed by a very small feather dipped in olive oil being passed through them.

5. *Loss of Voice.*—If the male, after moulting, lose his voice, he must have diet similar to that given to young birds; that is, some thoroughly-baked, stale roll, dipped in boiled milk or water until completely saturated; then press out the milk and

mix it with more or less, say a proportion of two thirds of coarse barley or wheat flour, freed from the husk or bran. Some persons give them a slice of pork or bacon to peck.

6. *Constipation* is cured by giving them plenty of green food, such as celery, water cresses, chickweed, sallad, &c.

7. *Epilepsy* is commonly brought on by too great a delicacy of treatment, and also by timidity, from alarm. Too great an abundance of rich food, and the want of proper exercise, whereby much and thick blood is produced, are the chief causes of this disease. The birds ought to be kept free from alarm, either by catching or tormenting them in any way. When suffering under this complaint, if they are hot, it is recommended to dip them frequently into cold ice water, and then pair their nails so closely as to start blood. A few drops of olive oil, also, given internally have proved serviceable.

8. *Overgrown Claws or Beaks* require to be pared with sharp scissors. Care must be taken, however, not to cut the nails too close, as the birds would be liable to lose so much blood as to become lame. The end of the "red ray," or vein, both in the beak and claws, when held up to the light, shows exactly how far they may be cut. During the hatching period, also, the nails of the female sometimes must be cut, in order that they may not be caught by them when in the nest.

9. *Lice* may be avoided by frequent bathing, cleanliness in the cage, and dry sand mixed with anise seed and scattered on the floor.

THE GOLDFINCH.

Synonymes.

Fringilla carduelis,	Of Ornithologists.
Chardonneret,	Of the French.
Distelfink, Stieglitz,	Of the Germans.
Jilguero,	Of the Spaniards.
Pintaçilgo,	Of the Portuguese.
Calderino,	Of the Italians.
Goldfinch, Thistle Finch,	Of the British and Anglo-Americans.

Of all cage birds, this is one of the most delightful, alike from the beauty of its plumage and the excellence of its song, its proved docility, and remarkable animation, whose body is almost always in incessant motion—now moving to the right and now to the left. Its song is shrill, agreeable, and heard during all seasons, excepting only at the period of moulting. It contains, besides many warbling and twittering notes, on which it dwells more or less, and the oftener the syllable *fink* is repeated the more it is admired. Some utter these notes only once or twice in their song, and others four or five times in succession. They also repeat airs, and the songs of other birds, but with difficulty; for they have not the same capacity as linnets and Canaries for these acquisitions.

Their docility is extraordinary, for they will even learn to fire small cannons and imitate death. They may also be taught to draw up their food and water in a little bucket.

Mr. Syme, in his excellent treatise on British Song Birds, gives the following amusing particulars respecting this species:—"The goldfinch is easily tamed and easily taught, and its capability of learning the notes of other birds is well known; but the tricks it may be taught to perform are truly astonishing. A few years ago, the Sieur Roman exhibited his birds, which were goldfinches, linnets, and Canaries. One appeared dead, and was held up by the tail or claws without exhibiting any signs of life; a second stood on its head with its claws in the air; a third imitated a Dutch milkmaid going to market with pails on its shoulders; a fourth mimicked a Venetian girl looking out at a window; a fifth appeared as a soldier, and mounted guard as a sentinel; and the sixth acted as cannoneer, with a cap on its head, a firelock on its shoulder, and a match in its claws, and discharged a small cannon. The same bird also acted as if it had been wounded. It was wheeled in a barrow, to convey it, as it were, to the hospital, after which it flew away before the company. The seventh turned a kind of windmill; and the last bird stood in the midst of some fireworks, which were discharged all round it, and this without exhibiting the least symptom of fear."

The Goldfinch is very generally distributed throughout Europe, occurring in most of the wooded and cultivated districts. Its song commences about the end of March, and continues till July or August. It may often be found in company with linnets, whose flight it somewhat resembles.

DESCRIPTION.

The goldfinch is five inches and three quarters long, of which the tail occupies two inches. The beak is five lines long, sharply pointed, and very slightly bent, compressed at the sides, whitish, with a horn-colored tip; the slender feet are brownish, and six lines high; the front of the head is of a bright scarlet red; a broad margin of a similar color surrounds the base of the beak; the chin and reins, black; the vertex black, terminating in a stripe, which passes the back of the head, and descends the neck on each side; on the top of the neck, there is a white spot; the cheeks and front of the neck, white; the back of the neck and back are of a beautiful brown; the rump whitish, with a brownish tinge; the longer feathers are black; both sides of the breast and the flanks of a bright-brown; the middle of the breast, the belly, and the vent, whitish, many of the feathers having a brownish tinge; the thighs, greyish; the pinion feathers, velvet-black, with whitish tips, which are smallest in old birds, and are sometimes wanting in the first two feathers; the middle of the external web with a golden-colored stripe an inch long, which, in conjunction with the golden yellow tips of the hinder large coverts, forms a beautiful spot; the coverts otherwise black; the tail slightly forked and black; the two, and sometimes the first three pinion feathers having a white spot in the centre of the inner web; the rest with white tips; sometimes also the third is likewise entirely black at the sides.

THE GOLDFINCH.

The female is a little smaller, not so broadly and beautifully red about the beak; the chin brownish; the cheeks intermixed with bright-brown; the small coverts of the wings, brown, and the back of a deeper dark-brown.

BREEDING.

The female goldfinch rarely lays more than once a-year, (consequently these birds do not greatly multiply,) and then from four to six eggs, which upon a pale sea-green ground are marked with pale-red spots and dots, and deep-red stripes. The young are fed from the crop. These, before they first moult, are grey upon the head. They can be reared upon poppy seeds and roll steeped in milk or water. They have greater facility in imitating the song of the Canary than that of any other bird; and with this bird they will produce fertile hybrids. To effect this, a male goldfinch is placed with one or two hen Canaries, and they very readily pair, especially if the goldfinch has been reared from the nest. The birds which spring from this union are not only beautiful in color and plumage—often yellow, with the head, wings, and tail of the goldfinch—but they will be found to excel in the sweetness and variety of their song. If you are apprehensive that a pair of valuable Canaries will not thoroughly hatch their eggs, nor let their young ones die, remove them to the nest of a goldfinch; they will not only hatch them, but will also feed the young, which, when nearly full fledged, may be placed in a cage until they can feed themselves, when no further trouble attends their rearing.

The characteristics which mark the principal varieties of this species are as follows:—

1. *Goldfinch* with a yellow breast.
2. *The White-headed Goldfinch.*
3. *The Black-headed Goldfinch.*
4. *The White Goldfinch.*
5. *The Black Goldfinch.*

The latter are either entirely black, which is caused by age or in being fed upon hemp seed, or they retain the yellow spots on the wings. Mr. Shelbach, of Cassel, in Germany, reared a nest of goldfinches, which he kept entirely secluded from the light of the sun, covering the cage with cloth. These birds were of a jet-black, with yellow spots, but they changed color after moulting. Those goldfinches which become black before old age, usually resume their former color after moulting, but then they do not usually live much longer.

FOOD.

The goldfinch feeds upon various kinds of seeds, groundsel, succory, salad, cabbage, rape, linseed, Canary, thistle, and alder seeds, &c. In the cage, it must be fed upon poppy seed and hemp seed, the first being given as its usual food. If allowed to run freely about, it will accustom itself to the second description of universal food described at page 13. It may also have given to it all sorts of green things, such as salad, cabbage, lettuce, and water cresses. It eats voraciously, and therefore, when allowed to run about in the chamber, perches upon the trough, and chases away, with a threatening gesture, every bird that approaches; whereas, it will feed with other birds that have any kind of resemblance to it, at least with respect to the character of their food, such as Canary birds, Siskins, &c.

DISEASES.

These birds are very subject to epilepsy. If they happen to have bad and swollen eyes, they should be anointed with fresh butter. Heaviness and greediness, occasioned by feeding too exclusively upon hemp seed, may be removed by giving them in lieu of it soaked salad and thistle seeds. It contributes much to their health, if occasionally supplied with the head of a thistle.

In old age, they become blind, and lose the beautiful red and yellow colors of the head and wings. Although frequently subject to sickness, there are instances of their having lived to the age of sixteen and even twenty-four years.

THE LINNET.

Synonymes.

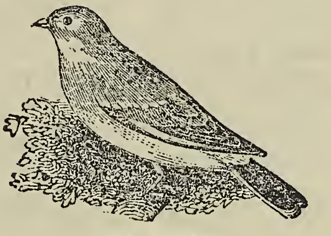
Fringilla cannabina,	OF ORNITHOLOGISTS.
Linot,	OF THE FRENCH.
Häufling, Lanning,	OF THE GERMANS.
Pardillo,	OF THE SPANIARDS.
Pintarroxo,	OF THE PORTUGUESE.
Fanello,	OF THE ITALIANS.
Linnet, Brown Linnet, Whin Linnet, Lintie, Greater Red Pole,	OF THE BRITISH.
Linnet,	OF THE ANGLO AMERICANS.

THE linnet, from its natural flute-like voice, excels most other song birds in its power of beautifully and purely imitating melodies and airs which are piped to it, and for this quality it is especially esteemed. It will also learn the song of all the birds in the room or cage that it hears. Its natural song consists of many connected strophies, and is the more beautiful the oftener it utters some high-sounding notes, which are called its "crowing," from its resemblance to the crowing of a cock. It sings both summer and winter, excepting the time of moulting.

DESCRIPTION.

THE length of this bird is more than five inches, of which the tail measures two inches and a half. The beak, six lines long, is dusky-blue in summer, and in winter greyish-white, with the point brown; the iris dark-brown; the feet, eight lines high, are black. There are some very striking varieties produced by the season and age in the plumage of the male, which are not observed in the female, and these have caused great confusion in works on birds.

A male three years old or less, is distinguished in spring by the following colors, and by the name of "red pole:"—The forehead is blood-red, the rest of the head reddish ash-colored, the top rather spotted with black; the cheek, sides of the neck, and the circle round the eyes, have a reddish-white tint; the feathers of the back are chestnut, with the edges lighter; the upper tail coverts are black, edged with reddish-white; the throat and under part of the neck are yellowish-white, with some dashes of reddish-grey; the sides of the breast are blood-red, edged with reddish-white; the sides of the belly are pale rust-colored; the rest of the under part of the body is reddish-white; the greater wing coverts are black, bordered with reddish-white; the others are rusty-brown with a lighter border. The quill feathers are black, tipped with white; the first are edged with white nearly to the point; the narrow beard forms a parallel white streak to the quill feathers; the tail is black and forked; the four outer feathers on both sides have a broad white border; that of the two middle feathers is narrower, and reddish-white.



THE LINNET.

After moulting, in autumn, little red is seen on the forehead, because the feathers become colored from the bottom to the top; the breast has not yet acquired its red tint, for the white border is still too wide; but when winter comes, its colors appear.

Males one year old have no red on the head, and more dashes of black; the breast is pale-red, waved with pale and dark; the under part of the feathers on the breast is only a bright, reddish-grey brown; the edges of these feathers are of a reddish-white; the back rust-color, having detached spots of dark-brown and reddish-white. These birds are known under the name of "grey linnets."

After the second moulting, if the reddish-grey feathers are blown aside, blood-red specks may be discovered on the forehead, and the red of the breast is only hidden by the wide yellowish-white borders to the feathers; these are the "yellow linnets," or the "rock linnets," as they are called in Thuringia.

Besides these three different varieties of plumage of the males, there are several clouded, produced by the seasons and old age; for instance, the older they become, the redder the head is. Birds brought up in the house never acquire the fine red on the forehead and breast, but remain grey like the males of one year old; on the other hand, old ones, red when brought into the house, lose their beautiful colors at the first moulting, and remaining grey like the young ones, are no more than grey linnets.

This difference of color does not take place in the females, which are smaller than the males; the upper part of the body is grey, streaked with dusky-brown and yellowish-white, on the rump, with greyish-brown and reddish-white; these spots are more numerous on the breast; the wing coverts are a dusky-chestnut. The females are distinguished in the nest by the back being more grey than brown, and by the number of streaks on the breast, which resemble that of the lark; bird fanciers leave these in the nest and take only the males.

Linnets breed twice a-year, and lay each time from four to six bluish-white eggs, covered all over with flesh-colored and reddish-brown spots and stripes. The male birds may be recognised in the earlier stage of their growth by the white ring round the neck, and the white on the tail and wings.

HYBRIDITY.

It is common for a male linnet to pair with a hen Canary, and hybrids produced by this means are easily reared, and can scarcely be distinguished from other grey Canaries, either from their appearance or song.

LINNET CAGE.

FOOD AND MANAGEMENT.

In confinement, linnets require nothing but summer cabbage seed,* which does not require to be soaked, as they are naturally seed-eating birds, having a powerful crop and stomach, and can therefore better digest it. Hemp seed, they must not have at all. They must not be too well fed in the cage; for, taking little exercise, they would soon die from over-feeding.

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* Winter cabbage seed, which does not injure them at liberty, soon kills them in confinement.

They like salt, and, contrary to the general rule, it is therefore well occasionally to intermix some with their food; and this is an excellent preventive against various maladies. When linnets are allowed to run about, they readily feed with other birds on the universal paste. Some green food must occasionally be given them, as also sand and water, as they like to bathe and dust themselves.

It is best to keep them in square cages, as they are less subject to giddiness in these than in round ones, and sing better. They are not often allowed to range the room, as they are very indolent, remaining immovable in the same place, and running the risk of being trodden upon; but if a small tree or a roost be placed in a corner, they may be let out of the cage with safety, as they will remain perched there, only leaving it to eat or drink, and will sing all day long.

DISEASES.

The most common disorders of this species are constipation, atrophy, and epilepsy; but linnets in confinement will generally live from twelve to sixteen years.

THE AMERICAN GOLDFINCH.

Synonymes.

Fringilla tristis,	OF ORNITHOLOGISTS.
Chardonneret jaune,	OF THE FRENCH.
Amerikanischer Distelfink,	OF THE GERMANS.
Jilguero americano,	OF THE SPANIARDS.
Pintaçilgo americano,	OF THE PORTUGUESE.
Calderino americano,	OF THE ITALIANS.
Yellow Bird, American Goldfinch,	OF THE BRITISH AND ANGLO-AMERICANS.

THIS very beautiful and familiar messenger of spring is known throughout this continent from the 49th parallel of north latitude to the savannas of Guiana and Surinam. As summer approaches, the males cast off their olive-colored winter suits, and appear in their temporary golden livery, with the front of the head, wings, and tail of a deep black, when they may be heard in concert, tuning their lively notes, several sitting on the same tree enjoying the exhilerating scene, basking and pluming themselves, and vying with each other in pouring forth their varied, soft, and cheerful song. When they sing all together, as they now do, it has a pleasing effect; their favorite note resembles the word *băbēe*, or *măy bé*, the last syllable protracted and much higher than the first. They have also a note, which they utter when flying through the air, that sounds somewhat like the word *physician*, pronounced very rapidly. But the most beautiful part of their song, is, when they raise and sink their voices in such a delightful cadence, that their music, at times, seems "to float on the distant breeze, scarcely louder than the hum of bees;" it then breaks out, as it were, into a *crescendo*, which rends the air like the loud song of the Canary.

In confinement, the yellow bird soon becomes familiar and reconciled, its song being nearly as animated and sonorous as its transatlantic congener. According to Mr. Audubon, it is extremely hardy, often remaining the whole winter in the Middle States, and when deprived of liberty, will live to a great age in a room or cage. "I have known two instances," says he, "in which a bird of this species had been confined for upwards of ten years. They were procured in the market of New York, when in mature plumage, and had been caught in trap cages. One of them having undergone the severe training, more frequently inflicted in Europe than America, and known in France by the name of *galerien*, would draw water for its drink from a glass, it having a little chain attached to a narrow belt of soft leather fastened round its body, and another equally light chain fastened to a little bucket, kept by its weight in the water, until the little fellow raised it up with its bill, placed a foot upon it, and pulled again at the chain until it reached the desired fluid and drank, when, on letting go, the bucket immediately fell into the glass below. In the same manner, it was obliged to draw towards its bill a little charriot filled with seeds; and in this distressing, occupation was doomed to toil through a life of solitary grief, separated from its companions, wantoning on the wild flowers, and procuring their food in the manner in which nature had taught them."

The food of the American goldfinch consists chiefly of the seeds of the various species of thistles, lettuce, hemp, and sunflower; and in winter, when its more agreeable food is not found in sufficient abundance, it resorts to the fruit and seeds of the elder. It also collects the tender buds of trees, as well as the confervas of brooks and springs, as a variety of its usual fare.

These birds occasionally do some damage to gardens by their indiscriminate destruction of lettuce and flower seeds, and they are therefore often disliked by gardeners; but their usefulness, in other respects, far more than counterbalances the trifling injuries they produce.

After being caught in trap cages, they feed as if quite contented; but, should it happen to be in the spring that they lose their liberty, and have thus been deprived of the pleasures anticipated from the previous union of a mate, they linger for a few days, pine away, and die. They are very fond of washing and bathing themselves, in clear shallow water, when the weather is mild, after which, they are engaged in picking up particles of sand and gravel, from which the fancier may take a useful hint.

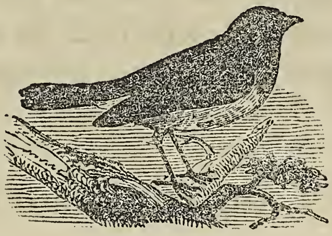
It is stated that it is more difficult to procure a mule, or hybrid, between this species and the Canary, than between the latter and the European goldfinch, although the cross has often been made with success.

THE AMERICAN ROBIN.

Synonymes.

Turdus migratorius,	Of Ornithologists.
Tourd emigrant, Grieve du Canada,	Of the French.
Auswanderer Drossel,	Of the Germans.
Tordo migratorio,	Of the Spaniards.
Tordo emigrante,	Of the Portuguese.
Tordo migrante,	Of the Italians.
American Robin, Robin Redbreast, Migrating Thrush, Red-breasted Thrush,	Of the British and Anglo-Americans.

THE American robin is a saucy familiar bird, fond of man's neighborhood, throughout North America, from the 56th parallel of north latitude to the table lands of Mexico, and is more frequently to be seen in our orchards and fields than in the denser woods. The confidence he reposes in us by taking up his abode in our vicinage; the frankness and innocence of his manners; the simplicity of his thrilling lays, delivered in all the artless energy of true love; and the peculiar pleasure with which we listen to his vocal powers, ever inspires us with attachment and universal respect. Besides, the endearing name he sometimes bears, recalls to mind the well-known legend, so oft repeated in our juvenile days, of the "favorite Robin Redbreast," said to have covered with a leafy shroud the lost and wandering "babes in the wood." He is commonly called "robin," though there is but little resemblance between him and his European congener, except in the single circumstance of his having a red breast.


EUROPEAN ROBIN.

The American robin, when reared in a cage, is of a lively and gentle disposition, docile, and seemingly content, and the melody and simplicity of his song, of which he is very lavish in confinement, renders him a special favorite. He sings well, readily learns to imitate lively parts of airs, and on the authority of Mr. Nuttall, some have been taught to pipe forth psalms even to so solemn a measure as that of "Old Hundred!" He also acquires a considerable capacity for mimickry, imitating the notes of many of the birds around him, as those of the pe-wee, blue bird, and whip-poor-will. At times, he becomes very tame, and will go in and out of the house with domestic confidence, appear uneasy when left alone, and will follow his owner, come to her call, peck at her finger, or kiss her mouth, with seeming pleasure. His principal song, both in confinement and at large, commences in the morning before sunrise, and at which time it is very loud, emphatic, and full.

The rufous color of the breast becomes deeper in those birds brought up in confinement, and the females are somewhat paler than the males. The young, during the first season, are spotted on the breast with dusk and white.

FOOD AND MANAGEMENT.

During the winter, according to Mr. Audubon, the robin feeds on the berries and fruits of our woods, gardens, and fields, and even of the ornamental trees of our cities and larger towns. The holly, sweet gum, gallberry, and the poke are those it first attacks; but as these fail, it feeds on the mountain ash, Carolinian cherry, and the azedarach. On the latter, in their annual migrations to Florida and the Southern States, these birds often glut themselves to such an inordinate degree, that they are sometimes found stupified by its narcotic power. In spring and summer, they devour worms and snails. They also pick up from the fields the seeds of maize.

In confinement, this bird feeds on bread soaked either in water or milk, and on most kinds of our native and edible fruits. Being equally fond of insects as when at liberty, he seizes on all that enter his cage, or come within his reach.

The robin is comparatively a hardy and long-lived bird, and instances are reported of its having been kept for nearly twenty years. It suffers much in moulting, even in a wild state, and when in captivity, it loses nearly all its feathers at once. In general, when due care is observed to cleanliness, it is freer from parasitic vermin than most other species.

* * *

THE SONG THRUSH.

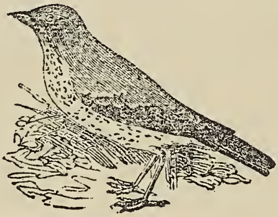
Synonymes.

Turdus musicus,	Of Ornithologists.
Grive, Tourd,	Of the French.
Singdrossel,	Of the Germans.
Tordo cantador,	Of the Spaniards and Portuguese.
Tordo,	Of the Italians.
Song Thrush,	Of the British and Anglo-Americans.

THE song thrush is one of the few birds whose clear and beautiful notes animates and makes pleasing the European woods. From the summits of the highest trees, it announces, by its varying song, resembling that of the nightingale, the approach of spring, and sings throughout the whole summer, especially in the morning dawn and evening twilight. For the sake of this song, it is kept by fanciers in a cage, whence evening and morning, even as early as February, it will delight a whole street by its loud and pleasing song, when hung outside of the window, or inside, so that the window be a little open. In Thuringia, it is reputed to articulate words. Its strophe was heard formerly more frequently than it is now. Only old and excellent birds still sing it. This thrush will live from six to eight years, if its food be varied.

DESCRIPTION.

This species is eight inches and a half long, of which the tail occupies three inches and a half; the beak is nine lines long, horny-brown beneath, and from the middle to the base, yellow; the irides nut-brown; the feet pale lead-color, one inch high; the whole of the upper part of the body olive-brown; the throat whitish-yellow, with a black stripe extending down its sides; the sides of the neck and breast, pale reddish-yellow, with numerous dark-brown, heart-shaped spots; the abdomen white, with oval dark-brown spots; the inside coverts bright orange-yellow; the pinion feathers grey-brown; the tail feathers the same.



THE SONG THRUSH.

In the female, the two black lines of the throat consist of small stripes, and the breast is pale yellowish-white.

FOOD AND MANAGEMENT.

The food of the song thrush, in a state of liberty, consists generally of earth worms, but in autumn they eat berries of all kinds. Earth worms constitute their chief sustenance, with which they also feed their young. They are easily fed in confinement, and the universal paste is an agreeable delicacy to them. Barley meal, or merely wheat bran, wetted with water is sufficient to nourish them. But to get them into a state fit for song, they must have a more generous diet, such as roll, bread, meat, and many other things which come to table, for they are not dainty. They are fond of bathing.

In confinement, this bird is usually placed within a trellis, or it is put into a large cage of any shape, but at least three feet and a half long, and nearly as high; for, being a large and wild bird, and in constant motion, it easily injures its plumage. It is best that such large birds should have a separate room appropriated to them, as their copious excrements smell offensively.

DISEASES.

The most usual maladies to which this bird is subject are a stoppage of the feather glands, constipation, and atrophy.

THE MOCKING BIRD.

Synonymes.

Turdus polyglottus,	Of Ornithologists.
Polyglotte, Tourd polyglotte, Grand Moqueur	Of the French.
Vielzüngler Vogel,	Of the Germans.
Tordo poligloto,	Of the Spaniards.
Tordo polyglotto,	Of the Portuguese.
Tordo poliglotto,	Of the Italians.
Mocking Bird,	Of the British and Anglo-Americans.

THIS "unrivalled Orpheus of the forest and natural wonder of America," inhabits the whole continent from the state of Massachusetts along the Atlantic, including several of the West-India Islands, as far south as Brazil; and from the table lands of Mexico, along the very base of the Rocky Mountains to Oregon, and the western sources of the river Platte. In short, he appears to dwell permanently in the milder regions of the New World, in either hemisphere; and those bred north of the Delaware, on this side of the equator, are all that ever migrate, in autumn, to more congenial climes.

The mocking bird, though destitute of brilliant plumage, is delicate and symmetrical in his proportions and beautiful in his form. His motions are easy, rapid, and graceful, perpetually animated with a playful caprice, and a look that appears full of shrewdness and intelligence. He listens with silent attention to each passing sound, treasures up lessons from anything vocal, and is capable of imitating with exactness, both in measure and accent, the notes of all the feathered race. And, however wild and discordant the tones and calls may be, he contrives with an Orphean talent, peculiarly his own, to infuse into them that sweetness of expression, and harmonious modulation which characterises this inimitable and wonderful composer. With the dawn of morning, while yet the sun lingers below the blushing horizon, our sublime songster, in his native wilds, mounted on the topmost branch of a tall tree or bush, pours out his admirable song, which, amidst the multitude of notes from all the warbling host, still rises pre-eminent, so that his solo is heard alone, and all the rest of the musical choir appear employed as mere accompaniments to this grand actor in the sublime opera of nature. Nor is his talent confined to imitation; his native notes are also bold, full, and perpetually varied, consisting of short expressions of a few variable syllables, interspersed with imitations, and uttered with great emphasis and volubility, sometimes for half an hour at a time, with undiminished ardor. These native strains bear a considerable resemblance to those of the brown thrush, with which he is so nearly related in form, habits, and manners; but like him, rude from cultivated genius, his notes are distinguished by the rapidity of their delivery, their variety, sweetness, and energy. As if conscious of his unrivalled powers of song, and animated by the harmony of his own voice, his music is, as it were, accompanied by chromatic dancing and expressive gestures; he spreads and closes his light, fanning wings, expands his silvered tail, and, with buoyant gaiety and enthusiastic ecstacy, sweeps around, and mounts and descends into the air from his lofty spray, as his song swells to loudness, or, in sinking whispers, dies away. While thus engaged, so varied is his talent, that it might be supposed a trial of skill from all the assembled songsters of the air; and so perfect are his imitations, that even the sportsman is at times deceived, and sent in quest of birds that have no existence around. The feathered tribes themselves are decoyed by the fancied call of their mates; or dive with fear into the close thicket, at the well-feigned scream of the hawk.

Soon reconciled to the usurping fancy of man, the mocking bird often becomes familiar with his master; playfully attacks him through the bars of his cage, or at large in a room; restless and capricious, he seems to try every expedient of a lively imagination, that may conduce to his amusement. Nothing escapes his discerning and intelligent eye nor faithful ear. He whistles, perhaps, for the dog, who, deceived, runs to meet his master; the cries of the chicken in distress bring out the clucking mother to the protection of her brood. The barking of the dog, the piteous wailing of the puppy, the mewing of the cat, the action of a saw, or the creaking of a wheelbarrow quickly follow with exactness. He repeats a tune of considerable length; imitates the warbling of the Canary, the lisping of the indigo bird, and the mellow whistle of the cardinal, in a manner so superior to the originals, that, mortified and astonished, they withdraw from his presence, or listen in silence, as he continues in triumph.

In the cage, also, nearly as in the woods, he is full of life and action, while engaged in song; throwing himself round with inspiring animation, and, as it were, moving in time to the melody of his own accents. Even the hours of night, which consign nearly all other birds to silence and rest, like the nightingale, he oft employs in song, serenading the houseless hunter and silent cottager to repose, as the rising moon illumines the darkness of the shadowy scene. His capricious fondness for contrast and perpetual variety appears to deteriorate his powers. His lofty imitations of the musical brown thrush are perhaps interrupted by the crowing of the cock, or the barking of the dog; the plaintive warblings of the blue bird are then blended with the wild scream and chatter of the swallow, or the cackling of the hen; amid the simple lay of the native robin, we are surprised with the vociferations of the whip-poor-will; while the notes of the garrulous jay, kildeer, woodpecker, Baltimore wren, and many others succeed, with such an appearance of reality, that we imagine ourselves in the presence of the originals, and can scarcely realise the fact, that the whole of this singular concert is the effort of a single bird. Indeed, it is impossible to listen to these Orphean strains, when delivered by a superior songster in his native woods, without being deeply affected, and almost rivetted to the spot, by the complicated feelings of wonder and delight, in which, from the graceful and sympathetic action, as well as enchanting voice of the performer, the eye is no less gratified than the ear.*

DISTINCTION BETWEEN THE MALE AND FEMALE.

The young male bird, which must be selected as a singer, may be distinguished by the breadth and purity of the white on the wings. This white spot, in a full-grown male, spreads over the whole nine primaries, down to, and considerably below, their coverts, which are also white, sometimes slightly tipped with brown. The white of the primaries, also, extends to the same distance on both vanes of the feathers. In the female, the white is less clear, spreads only over seven or eight of the primaries, does not descend so far, and extends considerably further down on the *broad* than on the *narrow* side of the feathers. The black is also more inclined to brown.

FOOD AND MANAGEMENT.

In a state of freedom, the principal food of the mocking bird consists of insects, grasshoppers, and worms. Dewberries from the fields, and many kinds of our cultivated fruits, together with insects, supply the young as well as the parents with food. In winter, they chiefly subsist on berries, particularly those of the Virginia juniper, (red cedar,) wax myrtle, holly, smilax, sumach, sour gum, and a variety of others.

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* Nuttall.

Successful attempts have been made to breed these birds in confinement by allowing them retirement and a sufficiency of room. Those which have been taken in trap cages are accounted the best singers, as they come from the school of nature, and are taught their own wild wood notes. The young are easily reared by hand from the nest, from which they ought to be removed at eight or ten days old. Their food is thickened meal and water, or meal and milk, mixed occasionally with tender fresh meat, minced fine. Animal food, almost alone, finely divided and soaked in milk, is at first the only nutriment suited for raising these tender nurslings. Young and old require berries of various kinds, from time to time, such as cherries, strawberries, whortleberries, &c., and, in short, any kind of wild fruits of which they are fond, if not given too freely, are useful. A few grasshoppers, beetles, or any insects conveniently to be had, as well as gravel, are also necessary; and spiders will often revive them when drooping or sick. But, notwithstanding all the care and management bestowed upon the improvement of this bird, it is painful to reflect that his extraordinary powers of nature, exercised with so much generous freedom in a state of confinement, are not calculated for long endurance; for, after this most wonderful and interesting prisoner has survived six or seven years, blindness often terminates his gay career—thus shut out from the cheering light of heaven, the solace of his lonely, though active existence, he now, after a time, droops in silent sadness and dies. At times, this bird is so infested with a minute species of louse as to be destroyed by it.

Good singing birds of this species generally command from $5 to $15 each, though individuals of extraordinary and peculiar powers have been sold as high as $50, or $100, each, ane even $300 have been refused!

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THE BROWN THRUSH.

Synonymes.

Turdus rufus,	Of Ornithologists.
Tourd roux,	Of the French.
Rother Drossel,	Of the Germans.
Tordo rojo,	Of the Spaniards.
Tordo ruço,	Of the Portuguese.
Tordo rosso,	Of the Italians.
Brown Thrush, Ferruginous Thrush, Thrasher,	Of the British and Anglo-Americans.
French Mockirg Bird,	Of the Southern States.
Red Mavy,	Of Some Parts of New England.

THIS large, cheerful, and familiar songster, inferior to none in musical talent, if we except the mocking bird, is found in almost every part of the United States from Canada to the shores of the Mexican Gulf, breeding, according to Mr. Nuttall, in all the intermediate space, though more abundantly towards the north. His voice somewhat resembles that of the European thrush, but is far more varied and powerful, rising pre-eminent amidst the forest choir. He takes no delight in mimicking the song of other birds, and therefore has no claim to the title of "mocking bird," as he is usually called at the south.

On the first appearance of this bird in the spring, he faulters in his song, like the nightingale, but when his mate commences the cares and labors incident to breeding and rearing her young, his varied and melodious notes are steadily poured out in all their vigor and strength. In the month of May, while the blooming orchards perfume the air and decorate the landscape, his enchanting voice, in his affectionate lay, seems to give grateful utterance for the bounty and teeming profusion of nature, and falls in pleasing unison with the harmony and beauty of the season. And even the young birds, in a state of solitary domesticity, without the aid of their parent's voice, already whisper forth in harmonious reverie the pathetic and sweet warble instinctive to the species.

Deprived of other society, in a state of captivity, the brown thrush is exceedingly familiar, cheerful, and capriciously playful. He courts the attention of his keeper, follows his steps, complains when neglected, flies to him when permitted to be at large, and gratefully sings and reposes when perched on his hand. In short, in all his actions, he appears capable of real and affectionate attachment; but, like many other animals, he is jealous of every rival, particularly any other bird, which he drives from his presence with unceasing hatred.

FOOD AND MANAGEMENT.

According to Audubon, the natural food of this species consists of insects, worms, berries, and fruits of all sorts, being particularly fond of ripe pears and figs. In winter, they resort to the berries of the sumach, holly, dogwood, and shrivelled wild grapes.

In a state of confinement, these birds may be reared in the same manner, and on the same kind of food as their congener, the mocking bird. In the autumn, of the first season, the young begin their musical studies, "repeating passages with as much zeal as ever did Paganini." By the following spring, their lessons are complete and the full powers of their song developed.

Like the American robin, the brown thrush suffers much in moulting, and often nearly loses all his feathers at once.

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THE CAT BIRD.

Synonymes.

Turdus felivox,	Of Ornithologists.
Gobe-mouche brun de Virginie, Moucherolle de Virginie, Tourd miaulant,	Of the French.
Miauendrossel,	Of the Germans.
Tordo de maullido,	Of the Spaniards.
Tordo miante,	Of the Portuguese.
Tordo miagolare,	Of the Italians.
Cat Bird,	Of the British and Anglo-Americans.

ONE of the most remarkable propensities of this quaint and familiar songster, which inhabits almost every part of North America from Mexico to Canada, and even Kamtschatka, is the unpleasant, loud, grating, and grimalkin-like mew, (*'pāy,*) that it often utters, on being offended or approached; and thus coupled with the name of a "wizzard animal," so much disliked by many, this delightful vocalist, which seeks out the very society of man, and reposes an unmerited confidence in his protection, is generally treated with undeserved obloquy and contempt.

"The cat bird," says Nuttall, "often tunes his cheerful song before the break of day, hopping from bush to bush, with great agility, after his insect prey, while yet scarcely distinguishable amidst the dusky shadows of the dawn. The notes of different individuals vary considerably, so that sometimes his song, in sweetness and compass, is scarcely at all inferior to that of the ferruginous thrush. A quaintness, however, prevails in all his efforts, and his song is frequently made up of short and blended imitations of other birds, given however, with great emphasis, melody, and variety of tone; and, like the nightingale, invading the hours of repose, in the late twilight of a summer's evening, when scarce another note is heard but the hum of the drowsy beetle, his music attains its full effect, and often rises and falls with all the swell and studied cadence of finished harmony. During the heat of the day, or late in the morning, the variety of his song declines, or he pursues his employment in silence and retirement."

About the dawn of day, if at large, the cat bird flirts about with affected wildness, repeatedly jerks his wings and tail, with a noise somewhat resembling a whip, stretching forth his head, opens his mouth, and mews. Sometimes this curious cry is so guttural as to be uttered without opening his bill. He often also gives a squeal as he flies from one place to another.

According to Latham, this bird is also capable of imitating the variable airs of instrumental music, and will sometimes mimick the cry of chickens so as to deceive and distress the parent hen. When reared from the nest, he is easily domesticated, becomes a very amusing companion, and seems attached to his cage. Although a pleasant songster, he is seldom kept in confinement, and I believe all attempts at breeding it, have failed.

FOOD AND MANAGEMENT.

The natural food of this species is similar to that of the ferruginous thrush, consisting principally of insects and worms, particularly beetles and wasps, and the various kinds of garden fruits.

In confinement, the food of these birds may be almost everything that is vegetable, except unbruised seeds, such as bread, fine pastry, containing little or no spices, cakes, scalded Indian meal, juicy fruits, and now and then some bread boiled in milk, a few insects, or minced flesh. The young, when taken from the nest, may be fed on ripe cherries, and other kinds of juicy fruits.

“Like all other thrushes,” says Mr. Audubon, “this is very fond of bathing and rolling itself in the dust or sand of the roads and fields. Several are frequently seen together in the borders of small ponds or clear rivulets, immersed up to their body, splashing the water about them until completely wetted; then ascending to the top of the nearest bushes, they plume themselves with apparent care, notwithstanding which, they are at times so infested with a minute species of louse as to be destroyed by it.”

THE EUROPEAN BLACKBIRD.

Synonymes.

Turdus merula,	OF ORNITHOLOGISTS.
Merle,	OF THE FRENCH.
Schwarzdrossel,	OF THE GERMANS.
Merlo,	OF THE SPANIARDS AND ITALIANS.
Melro,	OF THE PORTUGUESE.
Blackbird,	OF THE BRITISH.
English Blackbird,	OF THE ANGLO-AMERICANS.

BEING a permanent resident throughout the whole of the Old World, even as far north as Sweden, the European Blackbird is sufficiently hardy by nature to withstand the climate of nearly, if not all parts of the United States. Of all the thrushes, with perhaps the exception of the American robin, he is the most capable of instruction. His song is rich in melody, and contains some deep notes like those of the nightingale, varied, indeed, with some which are disagreeably harsh. At large, he sings only from March to July, especially at night; but in the cage, during the whole year except at moulting time. A single bird will enliven a whole street, so pure, distinct, and clear is his note. His memory, also, is so good, that he will learn several airs and melodies without mixing them; and sometimes even to imitate words. Neither does he forget what he has once well acquired.

DESCRIPTION.

The European blackbird is about the size of the song thrush, nine inches and a half long, of which the tail comprises four inches. The beak is one inch long, and of a golden-yellow; the irides dark-brown; the feet black, and fourteen lines high. The male is entirely of a deep-black; the female black-brown, rusty-colored on the breast, and with an ash-colored tinge upon the abdomen; the throat, spotted with light and dark-brown; the beak and the feet, black-brown, appearing also to be rather larger and heavier, and hence it has sometimes been considered a distinct species.

FOOD AND MANAGEMENT.

When wild, the blackbird, like other species of thrush, feeds on all kinds of edible berries, such as the elder, cherry, and mountain ash; and when this food is not abundant, it satisfies itself with the tips of the white thorn. At this time, it often seeks for insects near the vicinity of warm springs.

In confinement, these birds are content with the first kind of universal paste, described at page 13, but will also eat bread, meat, and most kinds of food that comes to table. The young, which must be taken from the nest when their quills have but just sprung, can be reared upon roll steeped in milk.

The blackbird should be kept in a large cage, for it is not prudent to allow it to associate with other birds, as either through covetousness or caprice, it will attack the smaller kinds, and even peck them to death. Like all the allied species, this bird is fond of frequent bathing, and consequently should be amply supplied with the means. In captivity, he will live from twelve to fifteen years, especially if his food be varied.

DISEASES.

The blackbird is particularly subject to a stoppage of the oil gland, which may be softened by the application of fresh butter, mixed up with a good deal of sugar, the aperture being enlarged by gently distending it with a needle, or a small knife; but a lead salve, or rather a salve of litharge of silver, white lead, wax, and olive oil, which must be ordered at an apothecary's, opens it best. The usual remedy is to pierce it with a needle, or to cut off the hardened gland. If this evil have not yet too severely affected the health of the bird, it may be sought to be remedied by puncturing the gland, compressing it frequently, bathing the bird with a syringe, and plucking out some of the feathers of the tail. The accumulated fat is absorbed in the renewal of the feathers, when the gland resumes its natural functions.

THE RICE BUNTING.

Synonymes.

Icterus agripennis, *Emberiza oryzivora*,	Of Ornithologists.
Ortolan agripenne, Ortolan de riz,	Of the French.
Reiss Ortolan, Fettammer von Carolina,	Of the Germans.
Hortelano de arroz, Hortelano con plumas agrias,	Of the Spaniards.
Cenchramo d'arroz, Cenchramo com pennas agudas,	Of the Portuguese.
Ortolano di riso,	Of the Italians.
Rice Bunting, Rice Troopial, Rice Bird, Reed Bird, Boblink, Bob-o-link, Bob Lincoln, Bob Linkling, Skunk Blackbird, Meadow Bird, Butter Bird,	Of the British and Anglo-Americans.

THIS well-known and truly migratory bird, familiarly known to everybody by the name of "Bob Lincoln," who, as a stranger, perhaps, thinks it a point of politeness thus to announce himself, as he sits on a rail of the fence, or the branch of a tree, on his annual return in the spring from the south, inhabits the whole continent of America, from Labrador to Mexico; although his winter residence appears to be more confined to Cuba, Jamaica, and other West-India Islands than to the main.

In the month of May, these birds fix their abodes in the "savannahs" of Ohio and Michigan, and the cool grassy "meadows" of New York, Canada, and New England for the purpose, principally, for hatching and rearing their young. The song of the male continues, with but little interruption, during the period of incubation, and his chant, at all times very similar, is both singular and pleasant. "Often, like the skylark, mounted and hovering on the wing, at a small height above the field, as he passes along from one tree top or weed to another, he utters such a jingling melody of short variable notes, so confused, rapid, and continuous, that it appears almost like the blending song of several different birds. Many of these tones are very agreeable, but they are delivered with such rapidity that the ear can scarcely separate them. The general effect, however, like all the simple efforts of nature, is good, and when several are chanting forth in the same meadow, the concert is very cheerful, though monotonous, and somewhat quaint. Among the few phrases that can be distinguished, the liquid sound of *Bob-ŏ-lee*, or *Bob-o-link*, *Bob-o-linké*, is very distinct.

"To give an idea of the variable extent of song, and even an imitation, in some measure, of the chromatic period and air of this familiar and rather favorite resident, the boys of this part of New England, [Cambridge,] make him shout among others, the following ludicrous dunning phrase, as he rises and hovers on the wing near his mate:—' *'Bŏb-ŏ-link, 'Bŏb-ŏ-link, 'Tŏm Denny, 'Tŏm Denny—'Cŏme păy me the twŏ-ănd-six-pence you've owed more than a year ănd ă half ago!—'tshĕ 'tshĕ 'tshĕ, 'tsh 'tsh 'tshĕ,'* modestly diving at the same instant down into the grass, as if to avoid altercation. However puerile this odd phrase may appear, it is quite amusing to find how near it approaches to the time, and expression of the notes, when pronounced in a hurried manner."*

This relish for song and merriment, confined wholly to the male, diminishes as the period of incubation advances, and when the young brood begin to flutter around their parents, the song becomes less freqent. Sometimes the female is inclined to have a second brood, for which preparation is made while she is yet engaged in rearing the first; but the male generally loses his musical talent about the first week in July; from which time, or perhaps earlier, his spring or pied dress begins gradually to be laid aside for the more humble brownish-black and brownish-yellow garb of the female, the whole, both old and young, then appearing nearly in the same songless livery, uttering only a *chink* of alarm when surprised.

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* Nuttall.

When the voice of the male begins to fail, with the progress of the exhausting moult, he flits over the fields in a restless manner, and merely utters a broken *'bŏb'lee 'bŏb'lee*, or with his songless mate, at length, a *'weet 'weet, b'leet b'leet*, or a noisy and disagreeable cackling chirp. But at the early dawn of day, while the tuneful talent of the species is yet unabated, the effect of their awakening and faultering voices, jingling throughout the wide expanse of meadows is singular and grand. These sounds mingle like the noise of a distant torrent, which alternately subsides and rises on the breeze, as the performers awake or relapse into rest; finally, they become more distinct and tumultuous, till, with the opening day, they assume the intelligible character of their ordinary song.

From the varied and changing plumage of this pleasing, and in some respects ludicrous bird, as well as for the singularity of his song, he is eagerly sought after by fanciers, and usually commands a fair price. Large numbers are annually captured in the Northen States in trap cages and fed, almost immediately after which, they resume their song. Many are purchased and carried to Europe, often to the disappointment of the adventurer, in regard to his profits, as, by the time they reach their destination, they change their livery and cease to sing.

FOOD AND MANAGEMENT.

The food of the rice buntings varies according to the season and locality in which they reside. Although on their early arrival at the north it consists of grubs, worms, caterpillars, beetles, grasshoppers, crickets, ground spiders, &c., they frequently feed on the seeds of dandelions and docks, the former of which are oily and sweet. Later in the season, and previous to leaving their native regions, they feed principally on various kinds of grass seeds, paricularly those of millet or other allied species (Panicums). If short of other food, they also attack the ripened fields of barley, wheat, and oats, in which they show their taste for plunder, and flock together like other blackbirds.

About the middle of August, vast parties of these birds enter the states of New York and Pennsylvania on their way south, where, along the margins of the large rivers, they find an abundant means of subsistence, during their short stay, on the seeds of wild rice (Zizania). As soon as the cool nights of October set in, and the wild rice crops begin to fail, these birds take their departure from New Jersey and Pennsylvania, and in their further progress through the Southern States, they congregate in large numbers in the rice fields, upon which they greedily feed, and, before the crop is gathered, they have already made their appearance in Cuba and Jamaica, where they subsist on the seeds of the Guinea grass, (Sorghum,) and become so fat as truly to deserve the name of "butter birds," and are highly esteemed for the table.

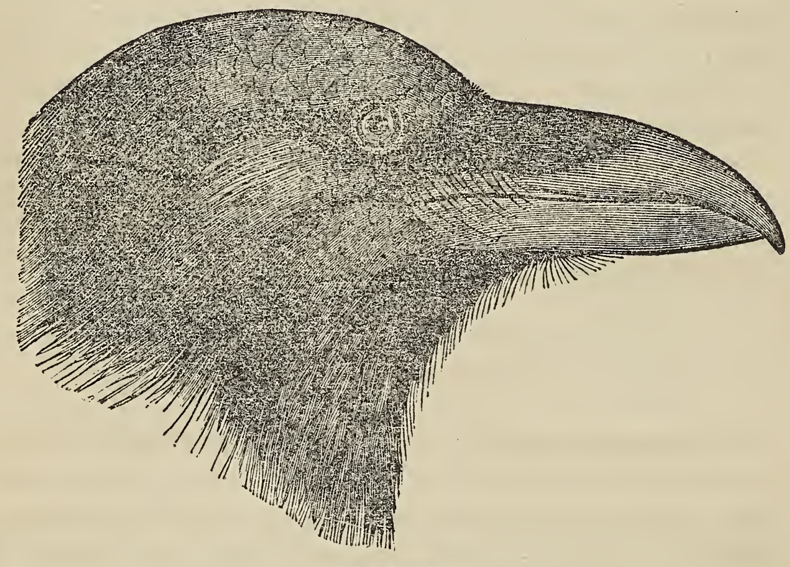
In a state of captivity, the food of this bird, during spring and summer, should resemble as nearly as possible that of nature; but in winter, he may be fed on rice, boiled in milk, millet, Canary seeds, wheaten bread, soaked in water, and minced animal food, containing no seasoning nor salt.

THE RAVEN.

Synonymes.

Corvus corax,	Of Ornithologists.
Corbeau,	Of the French.
Gemein Rabe, Kolkrabe,	Of the Germans.
Cuervo,	Of the Spaniards.
Corvo,	Of the Italians and Portuguese.
Raven, Crow, Corby,	Of the British and Anglo-Americans.

OF all birds which have a convex, round, knife-shaped bill, furnished at the base with hair projecting forwards, in other words, of all that belong to the tribe of crows, this, from the breadth of its tongue, is the most easily taught to imitate the human voice. On the ground, he walks in a stately manner, his motions exhibiting a kind of thoughtful consideration almost amounting to gravity. His ordinary voice consists of a hoarse croak, resembling the syllable *crŏck* or *crŭck;* but he frequently emits a note not unlike the sound of a sudden gulp, or the syllable *clŭck*, which he seems to utter when in a sportive mood; for, although ordinarily grave, the raven sometimes indulges in a frolic, performing somersets and various evolutions in the air. When divination formed a portion of the popular belief in Europe, this bird was held in considerable repute. Trouble was even taken to study its actions and all the circumstances attending its flight, and the various modulations of its voice. Of these, sixty-four different variations were enumerated, without including the more delicate intonations, exceedingly difficult to distinguish, to detect which, however, an excessively fine ear was requisite, as its cry, *crŏck* and *crŭck*, is so simple! Every distinct change had its peculiar signification, and there were not wanting people who studied to acquire this knowledge, while others carried their folly so far as to believe that, by eating the heart and viscera of this bird, they could acquire its prophetic powers.



THE RAVEN.

The raven may be said to possess a social disposition; for, after the breeding season has passed, flocks are often seen in the northern parts of Europe and the adjacent islands, amounting to one or more hundreds. These birds can perceive an object, as a dead carcass, at a great distance, but that they can smell carrion a quarter of a mile off, we have no satisfactory proof, neither need we believe that they can; for as we may account for the phenomenon by their sight, it is unnecessary to have recourse to their other faculties. Ravens have character in their flight, as men have in their walk. A poet sauntering by a river, a conchologist or fisherman hunting along the shore for shells, a sportsman searching the woods and fields for game, a lady running home from a shower, or a gentleman retreating from a mad bull, move each in a different manner, suiting the action to the occasion. In like manner, ravens, as well as other birds, might communicate intelligence, perhaps, several miles distant, judging by the flight of their neighbors, that they had a prize in view. In this way, a system of telegraphing could be extended over a large extent of country, and a great number of birds might be made to assemble in a single day.

When domesticated and treated with kindness, the European raven, as well as our native variety, becomes attached to his owner, and will follow him about the garden or house, with all the familiarity of a confiding friend.

FOOD AND MANAGEMENT.

Although the raven is omnivorous, its chief food is carrion, by which is here meant the carcases of sheep, horses, cattle, deer, and other quadrupeds, dolphins and cetaceous animals in general, as well as fishes that have been cast ashore. In autumn, it sometimes commits great havoc among grain, and in spring, it occasionally destroys young lambs. It has also been accused of killing diseased sheep by picking out their eyes; but of this there is no satisfactory evidence. It annoys the housewives sometimes by flying off with young poultry, and especially by breaking and sucking eggs which the ducks or hens may have deposited, as they frequently do, among the herbage.

When these birds are intended to fly about, the young must be removed when half fledged, about twelve days after they are hatched, and fed upon meat, snails, and earth worms; they are also accustomed to eat bread and roll steeped in milk. The description of food they seek, when at large, as young hares, birds, eggs, mice, young geese, chickens, snails, pears, cherries, &c., renders them partly injurious and partly beneficial.

This bird can be allowed to run at large, or fly about, and if reared from the nest, which must be the case if he is to be taught to speak, he will return to the place of feeding, upon calling him *Jăck*, the name he usually bears. All glittering metal, especially gold, must be hidden from him, or he, like some other bipeds, will carry it off. To facilitate his speaking, or to give his tongue greater freedom, which is necessary for articulate sounds, the tongue chord is sometimes loosened with the view of increasing or heightening his powers of speech. Individuals, however, have been heard to speak with an unloosened tongue. The raven is naturally a long-lived bird, individuals having been known to live upwards of one hundred years.

PIGEONS.

THE ROCK PIGEON, OR WILD DOVE.

Synonymes.

Columba livia,	Of Ornithologists.
Colombe, Biset sauvage,	Of the French.
Holztaube,	Of the Germans.
Paloma toreaz, Paloma del campo,	Of the Spaniards.
Pombo bravo,	Of the Portuguese.
Colombo salvatico,	Of the Italians.
Biset, Wild Rock Pigeon, White-Rumped Pigeon, Rock Dove, Wild Dove,	Of the British and Anglo-Americans.

THE rock or wild pigeon of Europe is well known as the inhabitant of the pigeon houses in various parts of the world, or "dove cots," as they are more frequently called, buildings expressly erected for the purpose of containing colonies of these birds. In this state, where they enjoy a perfect freedom of action, and are nearly dependant upon their own exertions for support, they can scarcely be called "reclaimed," much less "domesticated." Man, indeed, has only taken advantage of certain habits peculiar to the species, and by the substitution of an artificial for a real cavern, (their natural habitation,) to which the pigeon house may be compared, has brought it into a kind of voluntary subjection, without violating, or at least greatly infringing upon its natural condition, and has rendered it subservient to his benefit and use.

DESCRIPTION.

In its natural state, the bill of this bird is blackish-brown; the nostril membrane red, sprinkled, as it were, with a white powder; the irides, pale reddish-orange; the head and throat, bluish-grey; the sides of the neck and upper part of the breast are dark lavender-purple, glossed with shades of green and purplish-red; the lower part of the breast, abdomen, wing coverts, as well as the upper mandible, bluish-grey, the greater coverts and secondaries are barred with black, forming two broad and distinct bars across the closed wings; the lower part of the back is white; the rump and tail coverts, bluish-grey; the tail, deep-grey, with a broad black bar at the end; the legs and feet are purplish-red; the wings, when closed, reach within half an inch of the end of the tail.

ORIGEN OF FANCY PIGEONS AND THE COMMON HOUSE DOVE.

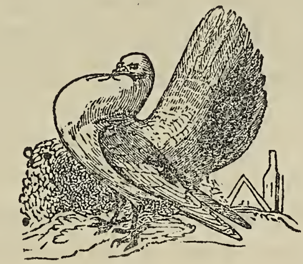
It is from the wild rock pigeon, (*C. livia*,) that all those numerous varieties, or, as they are frequently termed, "races," of the common inhabitants of the dove cot have descended, which are so highly prized, and fostered with such care and attention by the fancier, or amateur breeder; for, however diversified their forms, colors, or peculiarity of habit may be, they are all considered as having originated from a few accidental varieties of the common house pigeon, and not from any cross of that bird with other species, no signs nor marks whatever of such being apparent in any variety known to us. In fact, the greater part of them owe their existence to the interference and art of man; for, by separating from the wild rock pigeon, such accidental varieties as have occasionally occurred, by subjecting them to captivity and *familiarisation*, and by assorting and pairing them together, as fancy or caprice suggested, he has, at intervals, generated all the various races, and peculiar casts, which, it is well known, when once produced, may be perpetuated for an indefinite period, by being kept separate from, and unmixed with, others; or, in other words, what is commonly termed breeding "in-and-in."

Indeed, the fact, that all the varieties, however much they may differ in color, size, or other particulars, if permitted, breed freely and indiscriminately with each other, and produce a progeny equally prolific, is another and a convincing proof of their common and self-same origin; for it is one of those universal laws of nature, which, if once set aside or not enforced, would plunge all animated matter into indescribable confusion, that the offspring produced by the intercourse of different, (that is, distinct species,) is incapable of further increase. That such an intercourse may be effected, is well known; but it is generally under peculiar or artificial circumstances, and rarely when the animals, birds, or whatever they may be, are in their natural state, and in a condition to make their own election. Thus it is in the crosses obtained in a state of confinement, between the Canary and goldfinch, linnet, &c. But in all these instances, the progeny are invariably "mules," and as a general rule, are incapable of further production; for although they may exhibit the passions natural to the sexes, and the females may produce eggs, which, in general, even with extreme care, are found addled and incapable of being hatched. Such, I may add, is the case with hybrids of some of the crosses themselves; for the mongrel progeny of the wild turtle dove, (*Turtur communis,*) of Europe, with the turtle of the aviary, (*T. risoria,*) has been proved, by frequent experiments, to be barren, although the two species whence it originated appear to be closely allied, and a mixed breed is easily procured; and such I am justified in saying, would be the event, if a cross could be obtained between the rock pigeon, (*Columba livia,*) and the European wood pigeon, (*C. œnas,*) or stock dove, as it is improperly called, or with the ring pigeon, (*C. palumbus,*) or any other species.

VARIETIES.

To describe or particularise all the varieties possessed by fanciers, would require a volume in itself; as, in addition to the permanent races, or those which, when kept pure, transmit their likeness to their offspring, there are intermediate casts produced by particular crosses between individuals belonging to the different varieties, and which, though highly prized in the first generation, are not considered worthy of further extension; as their progeny cannot be depended upon, but are found to degenerate, and are liable to run into still more distant and less-valued races.

Among the numerous varieties kept in aviaries by fanciers, which are deemed worthy of being perpetuated by breeding distinct, the following are held in particular esteem:—



THE BROAD OR FAN-TAILED SHAKER.

This beautiful variety of the pigeon tribe receives the name of "fan-tail," from its habit of spreading out the feathers of its tail like a turkey cock, (for the same reason it is called *Pigeon paon* by the French,) and that of "broad-tailed shaker" from its breadth of tail, and a peculiar quivering motion of the neck, which is regarded as the attitude of courtship. From this motion, it is also sometimes called by the French *Pigeon trembleur paon.*

This bird has a full breast, and a short, handsomely-formed, arched neck, which it carries in a graceful swan-like curve. Its tail, according to the rules of the fancy, should consist, at the least, of twenty-four feathers; and at the most, of thirty-six, which number it should not exceed; for, if the tail be overcrowded with feathers, the bird suffers it to droop, a defect never overlooked, although the specimen may be faultless in every other respect.

Fan-tails, whose plumage is pure white, are more highly prized than those displaying red, yellow, blue, and black-pied colors; their carriage of the neck and tail being considered by far the most striking and elegant.

Some persons discriminate a variety which they call the "narrow-tailed shaker;" but this is only a degenerate breed of the fan-tail, or the result of a cross. Its neck is shorter and thicker, back longer, and it has not so many tail feathers as the broad-tailed shaker; neither does it expand its tail so fully, but keeps the feathers rather closed one over the other, so as to resemble a fan when some little way open. The color of its plumage is generally white; but a few different tints, and even an almond variety, are to be met with occasionally.

TUMBLERS.

These pretty pigeons are so called from their peculiar habit of tumbling backwards in the air when on the wing; besides which, they soar to so great a height as to be almost lost to the view; when flying, they congregate very closely together; and if they be good birds and accustomed to each other, they will maintain such a compact flight, that a dozen may almost be covered with a large handkerchief.

If the weather be warm and bright, they may be allowed to wing their aerial gambols for four or five hours in succession; but care must be taken, that no other species of pigeon mix with them, for if they once become familiarised and fly with others, they will gradually drop their highly-prized mode of flight, and of course become worthless. They should never be let out on a dull, heavy, misty morning, nor when a fog appears to be rising, nor during a high wind; as all such atmospheric variations, by causing desertions from their lofts tend to diminish the stock. A hen tumbler should never be allowed to fly while with egg.

The most esteemed tumblers do not somerset when swooping along, but only when they are beginning to rise, or when coming down to pitch; and to preserve this, and the high-flying properties in his stock, the provident fancier must spare no expence in the purchase of one or two first-rate birds that have been used to soaring, as they will be of much service in training the young ones.

When the birds are accustomed to their houses, they may be turned out upon the wing, but only once a-day. A bright grey morning is the best time, especially for young birds; and some hemp or Canary seeds must be scattered round their cots, to entice them in, when their hours of liberty have expired.

There is a particularly fine variety of this pigeon, which is called the "bald-pated tumbler," denoted by the cut below, from its having a beautiful snowy white head; it has pearl eyes, and in plumage is exceedingly diversified; the tail and flight feathers, however, match the head, which is pure white. When a tumbler, either of a black or blue color, has a long dash of white from the under jaw and cheek to a little way down the throat, it is called a "black" or "blue-bearded" bird, as the color may be; and if this beard be well shaped, and the bird be clean in the tail and flight, as before described, it may be reckoned very handsome and valuable. When these pigeons are dashing along in the brilliant sunshine, the lively contrast of their feathers adds much to the vivacity of their appearance.

BALD-PATED TUMBLER.

There is another and still more beautiful variety of this breed, called by some fanciers the "ermine tumbler," but which is generally known by the name of the "almond tumbler." It is an extremely elegant, and highly-prized variety, and is derived from common tumblers judiciously matched; as yellows, duns, whites, black-splashed, black-frizzled, &c., so as to sort the feathers.

When in perfection, tumblers are esteemed by many persons to be the prettiest of all the pigeon tribe; and this high opinion is borne out by the beautiful diversity of their colors, which are so elegant and rich, in some birds, that they have been compared to a bed of tulips. The more they are variegated in the flight and tail, especially if the ground color be yellow, the more they are prized; and a fine bright-yellow ground has the precedence of all others, from its being so exceedingly difficult to acquire, that twenty light-colored birds may be procured for one displaying a deep, richly-tinted ground.

THE CARRIER.

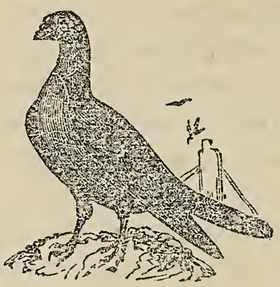
The carrier, *Pigeon de Turquie*, of the French, is somewhat larger than most of the common pigeons; its feathers lie very close and smooth, and its neck is long and straight. From the lower part of the head to the middle of the upper chap, there is a lump of white, naked, fungous-looking flesh, which is denominated the "wattle;" this, in good birds, is met by two small swellings of similar flesh, which rise on each side of the under chap; and if this flesh be of blackish color, the bird is considered very valuable. The circle round the black pupil of the eye is usually of a brick-dust-red color; but if it be of a brilliant red tint, it adds considerably to the value of the bird; this circle is surrounded by another of naked fungous flesh, generally about the breadth of a half eagle, the greater the breadth of which, the more it is admired. When the incrusted flesh round the eye is very thick and broad, it shows that the pigeon will prove a good breeder, and will rear fine young ones.

The properties attributed to the carrier, and prized by fanciers, are three in the head, three in the eye, three in the wattle, and three in the beak. The properties of the head consist in its being flat, long, and straight; for instance, if the head be very long, narrow, and flat, it is reckoned, in shape, perfect; if the contrary, it is termed a "barrel head." The properties of the wattle of the eye are its breadth and circular, uniform shape; for, if one part appear to be more scanty than another, it is termed "pinch-eyed;" and is of comparative little value; while, if it be full, even, and free from irregularities, it forms a "rose eye," and is highly prized. The wattle should be wide across the beak, short from the head to the point of the beak, and lean a little forward from the head; as the bird is said to be "peg-wattled" if it lie flat. The beak must be black, long, straight, and thick; if it be an inch and a half in length, it is considered a long beak, but it must never measure less than an inch and a quarter; if the beak be crooked, (hook-beaked,) or spindle-beaked, the value of the bird is much diminished. This variety, in general, is either dun or black in color, although white, blue-splashed, and pied specimens occur; the black and dun birds are usually the most perfect in their properties; but as the blues, whites, and pieds are very rare, even inferior birds of these colors are of consider- value.

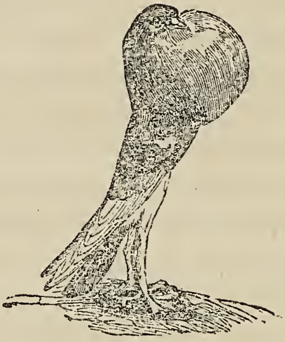
THE HORSEMAN.

Many fanciers suppose the "horseman" to be a cross breed, either between a tumbler and a carrier, or a pouter and a carrier, and then again bred from a carrier. In shape, it resembles the carrier, but it is smaller in all its proportions; its body being less, its neck shorter and the fungous-looking flesh round its eyes not exuberant, so that there is a greater space between the wattle on the beak, than that round the eye.

The most approved colors for this variety of pigeon are the blue, and blue-pied, as they are usually the best breeders. They should be flown twice a-day regularly, when young; and as they gain strength on the wing, they should be allowed to range loose, without any other birds in company. This variety is the kind generally employed in carrying letters; the genuine carriers being much too scarce and valuable to be commonly used.



THE HORSEMAN.



THE POUTER.

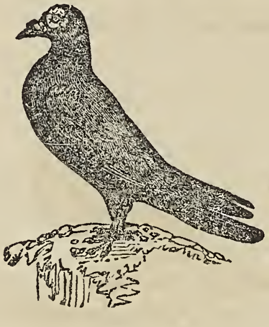
All pigeons, as is well known, have the capability of inflating their crops with air; and a fine pigeon, with breast feathers glossed with metallic tints, strutting and bowing, with an inflated crop, around his mate, presents no uninteresting spectacle; but this remark will not apply to this bird. In the "English pouter," or "pouting horseman," there is nothing pleasing in its appearance nor graceful in its proportions; indeed, the inflation of the voluminous crop, rendering an erect, stiff, and apparently constrained attitude necessary, gives an aspect of distortion, or a want of a due balance of parts.

The pouter is of large size, often measuring eighteen inches in length from the tip of the beak to the end of the tail. The chest is not really voluminous, though it appears enormous when the crop is distended with air; the back is concave, and the tail ample; the tarsi are very long, and covered with downy feathers. These pigeons are of various colors, as blue, rufous, pied, or altogether white. Those birds which are tall, erect, with a very ample crop, and with the colors of the plumage regularly disposed, and according to certain fancy rules, are esteemed the most valuable.

The pouter is formed by a cross between the "dragon" and the "old Dutch cropper," which latter bird, except in the development of the crop, (whence its name,) had nothing to recommend it. From this intermixture, not without much care and expense, has resulted this favorite variety. The flight of the pouter is buoyant, but not rapid, nor capable of being long sustained. As varieties of the pouter, or rather as breeds allied to it, may be mentioned the "uploper" and the "Parisian pouter," said to be a beautifully-marked bird; but with these, I have no personal acquaintance.

Pouters are very expensive birds to rear, as the strain will soon become degenerate. As the old birds pay little attention to the wants of their young, it frequently happens that the tiny creatures are starved to death. Careful fanciers, therefore, never allow them to hatch their own eggs, but shift them as soon as they are deposited under a hen "dragoon," that has lately laid; and place the eggs of the latter bird under the pouter, in order that she may commence incubation; otherwise, she will lay again in a short time, which, often repeated, would, in all probability, kill her. Every pouter must be kept by itself during the winter season; and their coops must be lofty, so that they may not acquire a stooping habit, which is a very great fault. In the spring, every pair of pouters must have two pair of dragoons to tend and feed them; but care must be taken that the dragoons are kept in a loft separate from the pouters, as otherwise, a cross breed would probably be the result, and the stock become degenerate.

Pouting horsemen are not so much in repute as formerly, the "almond tumblers" having almost superseded them.



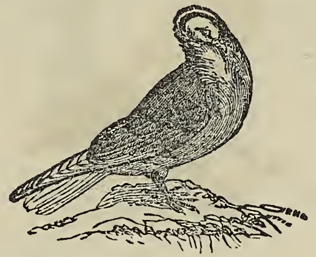
THE DRAGOON, OR DRAGON.

Dragons are bred between a tumbler and a horseman; and by frequently crossing them with the horseman, they acquire much strength and swiftness. They are exceedingly good breeders and kind nurses, and are, therefore, often kept as feeders for rearing young Leghorn "runts," pouters, &c.

The dragon is somewhat lighter and smaller than the horseman; and one of its chief beauties consists in the straightness of the top of its skull with that of its beak, which, according to the rules of the fancy, should form almost a horizontal line. These birds should be flown and trained while young, in the same way as the horsemen, which they are considered to surpass in swiftness, in short flights of from ten to twenty miles; but in longer distances, if the horsemen be well bred, they will far outstrip the dragoon.

THE JACOBIN.

This pigeon, often called a "Jack," is, when perfect in its properties, extremely rare. The real Jacobin is a very small bird, and the smaller it is, the more valuable; it has on the hinder part of its head, inclining towards the neck, a range of inverted feathers, in appearance like the cowl, or cap, of a monk; and from this peculiarity, it receives the sobriquet of "Jacobin," or "capper." These feathers are technically termed the "hood," and if they grow compact and close to the head, they enhance the value of the bird considerably; the lower part of the hood is called the "chain," and the feathers composing it should be long and thick.



THE JACOBIN.

A small head, very small spindle-shaped beak, and beautifully clean, pearl eyes are other properties of this little pet. Yellow, red, blue, and black are the colors usually bred, and in point of color, the yellow birds are preferred before all others; however, let the color of the body be what it may, according to the rules of the fancy, the tail, flight, and head must invariably be white; sometimes the legs and feet are covered with feathers.

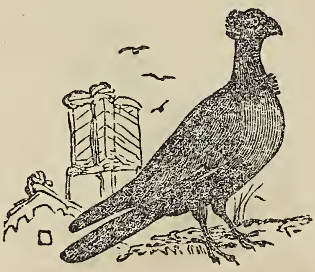
THE CAPUCHIN.

In its properties, this variety is closely allied to the Jacobin, and is, by some fanciers, considered a cross between that breed and some other kind. It has a longer beak, and is altogether a larger bird, than the Jacobin; its hood is extremely pretty, but it lacks the chain.

THE MAWMET.

The Mahomet, commonly corrupted to "Mawmet," is a beautiful cream-colored bird, with bars of black across its wings;

although the surface of its feathers is of a cream-color, the part next the body, the flue feathers, and even the skin, are of a dark sooty tint; it is about the size of a "turbit," but it has in place of a frill, a fine gullet, with a seam of beautiful feathers; its head is thick and short, and its eyes orange-color, surrounded by a small, naked circle of black flesh; it has a little black wattle on its beak, which is short and stout, and somewhat resembles that of a bulfinch.



THE BARB.

This variety was originally brought from Barbary. In size, it is somewhat larger than the Jacobin; it has a short, thick beak, a small wattle, and a circle of thick, naked, incrusted flesh round its eyes; the wider this circle of flesh spreads round the eye, and the more brilliant its color, the more the bird is prized; the circle is narrow, at first, and is not fully developed until the bird is three or four years old.

The plumage of the Barb is usually dun or black; but there are pied birds of both colors; these last are held in little estimation, as they are supposed to be only half bred; when the pinion feathers are dark, the irides of its eyes are pearl color; but when the pinions are white, the irides are red. Some of these birds are ornamented with a tuft of feathers rising from the back part of the crown of the head.

THE TURBIT.

This variety is somewhat larger than the Jacobin. Its head is round, and beak short; from the breast grows a tuft of feathers named the "purle," spreading in opposite directions, like the frill of a shirt; and from the beak to the purle reaches the gullet.

The colors of this pigeon are mostly yellow, dun, red, blue, and black; and accasionally chequered. According to the fancy, the back of the wings and tail should correspond in color, except in the yellow and red birds, whose tails should be white. A stripe of black should cross the wings of the blue birds, but the other body and flight feathers should be white; they are termed "black-shouldered," or "blue-shouldered," as their color may be; and when of one color only, these pigeons have been sold as "owls." Turbits are also chosen for the shortness of their beaks, and their spreading "purle;" and if well-trained, when young, they will become excellent flyers.

THE TURBIT.

THE NUN.

The nun is greatly admired, from the elegantly contrasting colors of its plumage. Its body is generally white, and its tail and six flight feathers of its wings should be either wholly red, vivid yellow, or black, as likewise its head, which is adorned and nearly covered by a tuft, or "veil," of pure white feathers.

According to its colors, the bird is termed a red, yellow or black-headed "nun," as it may happen to be; and whenever the feathers vary from this rule, the bird is termed "foul-headed," or "foul-flighted," and is greatly diminished in value; but with such as frequently rear clean-feathered birds, as perfect specimens, it is scarcely possible to obtain one entirely free from foul feathers. Smallness of head and beak, a pearl eye, and largeness of veil, are desirable properties in this bird.

THE HELMET.

This variety is a somewhat larger bird than the nun. Its head, tail, and flight are mostly of one color, either yellow, blue, or black tint, and the other parts of the body are generally white; its head bears a delicate tuft of feathers, differing in color from the body, and in form like a helmet. It is a pretty bird, but is not a fine flyer. It is most useful as a nurse.

To the varieties already enumerated, I might add several others, as the "owl," the "ruff," the "spot," the "lace," the "finnikin," and the "Friezland runt;" but these breeds are not common, nor are they generally held of much account. As for the French, Leghorn and the Spanish "runts," they are not to be placed among the fancy varieties, being remarkable merely for their size, and are appopriate for the dove cot.

FOOD.

In a state of nature, the rock dove feeds on grain and seeds of various kinds, as well as on vegetables. According to Montagu, it also devours some kinds of snails, and is particularly fond of the Helix virgata.

In a state of confinement or *familiarisation*, these birds are fond of almost every kind of grain, but old tares are found, by experience, to be the best for them; horse beans, particularly the smaller sorts, as small ticks, are considered next to tares in point of nutritive properties; oats, barley, wheat, and peas, may be given occasionally, and will be found wholesome varieties of diet. Pigeons are very fond of rape, hemp and Canary seeds, which, however, should only be given occasionally; and new tares should especially be given to young birds very sparingly. Many fanciers make a composition of salt, lime mortar, and a little clay, mixed with spicy seeds, as caraway, which they allow their pigeons to feed upon at will.

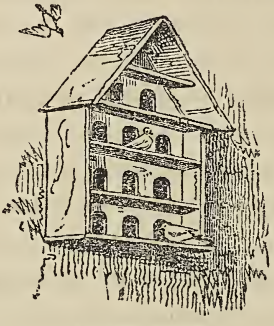
The seed may be scattered on the floor amongst the gravel, although many persons recommend little contrivances to put it in, on the score of keeping it cleaner and better.

DOMESTIC ACCOMMODATION AND MANAGEMENT.

Familiarised, or fancy pigeons are generally confined in aviaries, or lodged in appropriate buildings attached to or near the house of the breeder, in order that they may be regularly and easily fed, cleansed, and duly attended to in all matters having reference to their condition and health; for their natural instinct and feeling of liberty have been so nearly effaced, or placed in abeyance by the captivity to which they have been subjected, for so many generations, that they have become nearly dependent upon man for support, and have lost the power or capability, even when allowed to fly at large, of looking for and finding their own food.

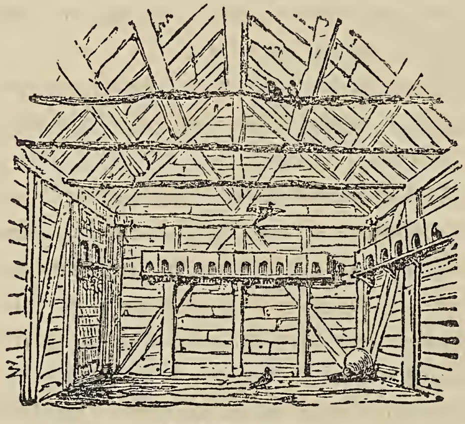
In these buildings, it is common to erect a certain number of boxes, or divisions, against the walls or sides, each calculated to accommodate a pair of pigeons, with their nest and young. They succeed best when separate and distinct from each other, with a small platform, and an entrance just large enough to admit the bird; as when disposed in a continuous row, and open in front, they are apt to interfere with each other, and, by their jealousies and contentions, prevent the due increase of eggs and young.

The most common shape for a pigeon house is the one represented in the succeeding illustration, but the form is immaterial. It is, however, necessary that the holes should be large enough for the birds to turn round in with ease; and there should be in front shelves and partitions of from seven to nine inches in depth, so as to keep the couples apart, and afford them resting places; and two holes for each couple, between each partition, will be desirable. The cot should be fixed where it will be screened from cold winds, which are extremely prejudicial to the birds; a southern or south-western aspect should, therefore, if possible, be chosen; visits from cats and rats must also be carefully guarded against.



PIGEON HOUSE.

If the young fancier be enabled to fit up a loft over a stable, or other out-building, for a pigeon house, the best arrangement he can adopt is that shown in the above illustration. The means for exit and re-entrance must be first thought of; and if there be no window in the loft, two holes must be made in the wall, at about five feet from the floor, each sufficiently large to admit a pigeon easily; a shelf should be fastened on the inside, and another on the outside, of the said apertures; on



PIGEON LOFT.

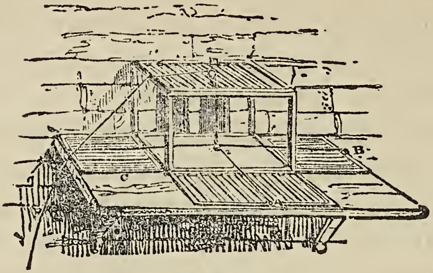
this latter shelf, a trap, or "aerie," should be affixed, the intent and purposes of which I shall presently explain. At the upper part of the loft, rough branches should be placed as perches in the manner shown in the representation. At about four feet from the floor, breeding boxes, according to the number of birds intended to be kept, should be securely fixed to the wall, care being taken to protect them from rats, &c.

Some fanciers furnish their boxes with little earthenware pans, or small baskets, for the birds to deposit their eggs in; although the eggs are not so likely to be broken in the baskets as in the pans, the latter, if supplied with straw, are cleaner than the baskets; the pans should vary in dimensions, according to the class of pigeon for which they are designed. It is well to put two of these receptacles in each little room, as the hens frequently go to the nest again when their broods are about three weeks old, leaving them to the care of their mates. Instead of egg boxes, shelves partitioned off, and having sliding fronts for the convenience of cleaning, are used; if the young fancier intend to keep "pouters," the shelves should be fourteen inches in breadth, and at least twenty inches apart, so that the birds may not acquire the habit of stooping, which depreciates their value.

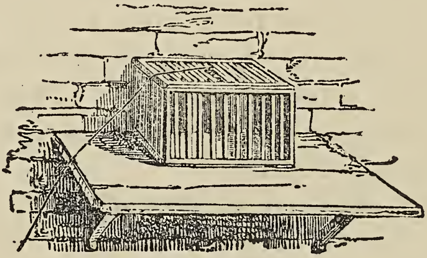
As pigeons drink differently from most other birds, that is, by taking a long-continued draught, like cattle, a fountain, or large-bottomed glass bottle, with a tolerably long neck, for water, should be provided for their house; it should be placed on a small three-legged stool, so that its mouth may incline into an earthenware pan, into which the water will trickle slowly, and cease when it reaches the level of the mouth of the bottle, and a continued supply of fresh water thus be kept up; two or three bricks will serve instead of a stool, to give the bottle the necessary elevation.

To insure the thriving of the birds, the loft and shelves should be kept clean, and gravel strown on the floor; indeed, gravel must on no account be omitted, as pigeons are exceedingly fond of pecking it.

The "aërie" before mentioned, which is fastened on the shelf outside of the loft, is a trap made of laths. It has two sides and a front only, the wall of the loft forming the back; the front and sides act upon hinges, so that they may be thrown open, and laid flat on the platform, as in the above figure *A*, *B*, *C* and on the upper parts of these flaps are fastened strings, united to a single string in the middle of the trap; the string is carried over the swivel *E*, at the top of the machine, to a hiding place, whence the owner can see all that passes, and when a bird alights within the aërie, he jerks the string, the flaps are elevated, and the bird is immediately a prisoner. The aërie, when shut, presents the appearance shown in the following illustration. This kind of trap is used not only by fanciers, but by amateurs; and is an important appendage to the loft, both as a means of self-defence to secure strays, and to shut in their own birds. Among amateur fanciers, the first-mentioned purpose is to secure valuable and favorite breeds from being deteriorated through stray birds of no value pairing



AERIE OPEN.



AERIE CLOSED.

with them. When any strays are taken in the trap, they are killed for the table, unless called for and claimed by their owners, within twenty-four hours after their capture, and a trifling sum may then be demanded for trappage.

To ensure the purity of any particular kind, the young males, as soon as they show symptoms of maturity, which may be known by particular gesticulations and their cooing notes, are placed apart in a chamber appropriated for the purpose, with a female of the same variety. Here they remain till a mutual attachment has taken place, after which, they may be returned to the general aviary, or dove house; for, when once an alliance is effected, it generally continues undissolved and inviolate till the death or removal of one of the parties; on which account many different varieties may be kept in the same aviary, or associated together in one building, without much apprehension of having a contaminated breed.

For mating, or coupling pigeons, it is a good plan to build two cots, divided only by a lath partition, by which means the birds will see each other, and may feed out of the same little vessels; when, by giving them plenty of hemp seed, they will soon be fit for mating. When the hen sweeps her tail, put her in the cock's pen, and they will readily agree. Where it is not convenient to make this probationary pen, and you are obliged to place them both in one coop, put the cock in a few days before his mate, that he may get accustomed to it, and feel himself master, especially if the hen be high spirited; else they will quarrel so fiercely, that their disputes will terminate in a total dislike to one another.

When the pigeons are comfortably matched, allow them the full run of the loft, to select a nest for themselves; or choose a nest for them, and inclose them in it for several days, by means of a slight lath railing, giving them an abundant supply of food and water during the whole time. Both male and female engage in the construction of the nest, and relieve each other in the task of incubation. Two eggs only are laid, and the young are hatched blind, naked, and helpless, and sedulously fed and cherished by both parents. Several pairs of young are reared during the season. The young are fed for some days after exclusion from the egg, not on grain, nor insects, but upon a peculiar lacteous secretion, or curd-like matter, which is poured out from a series of glands in the crop both of the male and female, which glands develope themselves into activity by a mysterious law at the proper juncture. This lacteous fluid is very abundant, and will frequently drip from the bills of the pigeons as they approach their young. It is thrown into the open mouths of the nestlings by a kind of exgurgitation, the receiving one and the giver being both in agitation. In the course of a few days, pulse or grain, moistened in the crops of the parents and mixed with this lacteous curdy fluid, is given, the secretion gradually decreasing as it is less and less required, till at length peas, moistened or macerated in the crop, are alone transferred into those of the young.

About the third day, some of the ordinary food, after maceration in the crop, is added, its proportion being increased, till at length, when the young quit the nest, it constitutes their food entirely.

Though fancy pigeons are kept for the sake of their beauty and peculiarities, the ordinary dove-house pigeon is reared almost exclusively for the sake of its flesh, which is accounted in most countries a delicacy. But how far the rearing of great numbers of these birds is profitable in our country may admit of question; the quantity of peas, beans, and grain, which even a small flock will annually consume, is enormous. What, then, must be the consumption of flocks of many hundreds?

DISEASES.

The *megrims*, or epilepsy, is an incurable disorder, in which the pigeon moves about and flutters at random, with its head turned, and its bill resting upon its back.

If the birds suffer much while *moulting*, remove them to a warm place, mix a good quantity of hemp seed in their ordinary food, and tinge their water with saffron.

When the birds are affected with the *wet roup*, give them a few pepper corns once in three or four days, and put some green rue in their water.

The *dry roup* is a husky cough, arising from a cold; when three or four cloves of garlic should be given to the birds daily.

When your pigeons are *infested with insects*, fumigate their feathers thoroughly with tobacco.

The *canker* is occasioned by the cocks pecking each other, which, as they are extremely irritable, they often do. To cure it, rub the part daily with a mixture of burnt alum and honey.

If the incrusted flesh round the eyes of "carriers," "Barbs," or "horsemen," be injured or pecked, bathe it with salt water; and if, in some days, this remedy does not succeed, another lotion composed of three drachms and a half of alum, dissolved in two ounces of water should be tried.

When "pouters" and "croppers" *gorge* themselves, by over-eating, after long fasting, put the bird, feet downward, into a tight stocking, smoothing up the crop so that, overloaded as it is, it may be kept from hanging down; then hitch up the stocking on a nail, and keep the bird a prisoner until its food is digested, supplying it with a small quantity of water occasionally. When the bird is taken out of the stocking, it should be put into an open coop or basket, and fed but scantily for a while.

For *lameness*, or *swelled balls of the feet*, whether from cold, cuts with glass, or any accident, the most effectual application is a small quantity of Venice turpentine spread on a piece of brown paper.

THE EUROPEAN QUAIL.

Synonymes.

Tetrao coturnix,	Of Ornithologists.
Caille,	Of the French.
Wachtel,	Of the Germans.
Codorniz,	Of the Spaniards and Portuguese.
Quaglia,	Of the Italians.
Quail, Common Quail,	Of the British and Anglo-Americans.

BESIDES beauty of form and plumage, the song of the common quail of the Old World is no slight recommendation to the amateur. In the breeding season, that of the male commences by repeating softly, tones resembling *verra, verra,* followed by the word *pieveroie,* uttered in a bold tone, with the neck raised, the eyes shut, and the head inclined on one side. Those that repeat the last syllables ten or twelve times, consecutively, are the most esteemed. That of the female only consists of *verra, verra, pupu, pupu,* the last two syllables being those by which the male and the female attract one another's attention; when alarmed or angry, their cry resembles *guillah!* but at other times, it is only a murmur, resembling the purring of a cat. This bird never sings when left to run about in a light room, except during the night, but continually when in a darkened cage.

When wild, the quail is found throughout the eastern continent. It is a bird of passage, arriving in Europe in May, and taking its departure at the end of September.

THE EUROPEAN QUAIL.

FOOD.

In a wild state, the quail feeds on wheat and other corn, rape seed, millet, hemp seed, and the like. It also eats green vegetables, as well as insects, and particularly ants' eggs.

In the house, it is fed on the same food, adding bread, barley meal, mixed with milk, the universal paste, and occasionally salad or cabbage, chopped up small, and, that it may want nothing to keep it in health, plenty of river sand for it to roll in and peck up grains, which assist its digestion; but this sand must be damp, for if dry, it will not touch it. It drinks a great deal, and the water, contrary to the opinion of some persons, should be clear, and never turbid. It moults twice in the year, once in autumn, and again in spring; it then requires river sand, and greater attention than at other times.

BREEDING.

The quail breeds very late, never before July. Its nest, if it can be called so, is a hole scratched in the earth, in which it lays from ten to fourteen bluish-white eggs, with large brown spots. These are hatched after three weeks' incubation. The young ones, all hairy, follow the mother the moment they leave the shell. Their feathers grow quickly, for in the autumn they are able to depart with her to the southern countries. The males are so ardent, that if one is placed in a room with a female, he will pursue her immediately with extraordinary eagerness, tearing off her feathers if she resist in the least; he is less violent if he has been in the same room with her during the year. The female, in this case, lay a great many eggs but rarely sits on them; yet if young ones are brought her from the field, she eagerly receives them under her wings, and becomes a very affectionate mother to them. The young must be fed on eggs, boiled hard and cut small, but the best way is to take the mother with the convoy, which may be done with a net. She watches over them attentively, and they are more easily reared. During the first year, one would think that all the convoy were females, the males resemble them so much, particularly before the brown shows itself on the throat.

The adult female, however, differs very sensibly from the male; her throat is white, and her breast paler, and spotted with black, like that of the throat.

MANAGEMENT.

In the house, if allowed to range, its gentleness, neatness, and peculiar motions are seen to advantage; but it is often kept in a cage of the following make:—

A small box, two feet long, one foot deep, and four high, of any shape which is preferred; in this are left two or three openings, one for drinking at, the other to give light; besides this all is dark; the bottom is a drawer, which should be covered with sand, and have a seed drawer at one end; the top is of green cloth; for as the quail often springs up it would hurt itself were it of wood. The case should be suspended during the summer outside the window, for the quail sings much more when confined in this manner than if allowed to range the room, where there are many things to call off its attention from its song.

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AN

ESSAY ON MANURES,

SUBMITTED

TO THE TRUSTEES

OF THE

MASSACHUSETTS SOCIETY

FOR

PROMOTING AGRICULTURE,

FOR THEIR PREMIUM.

BY SAMUEL L. uther DANA.

Manures are the riches of the field.—CHAPTAL.

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ESSAY.

SECTION I.

CLEARING AND BREAKING UP, AND MAKING COMPOST.

There is one thing settled in farming, stable manure never fails. It always tells. There are no two ways about it. There is here neither theory, nor speculation, nor doubt, nor misgiving. "Muck it well, master, and it will come right," is an old proverb. It is considered a fact so well established, that nobody thinks of disputing it. There is advantage in asking why barnyard manure never fails. The answer is easy. It contains all that plants need for their growth. If we know then what plants contain, we can easily tell what is in manure. The whole doctrine of manures, then, falls into two plain principles, on which hang all the law and the "profits" of agriculture.

1st. Plants contain and need certain substances which are essential to their growth.

2d. Manure contains all those substances which plants want. If, then, we would find out what it is which manure contains, that makes plants grow, we must first find out what a grown plant contains. This cannot be done without some little, a very little knowledge of chemistry. Do not be startled, reader. I suppose that you may know nothing of chemistry, no, not even its terms. As a very sensible man, who wrote letters on botany to a young lady, said, to en courage his pupil, it was possible to be a very good botanist without knowing one plant by name, so is it possible to become a very good agricultural chemist, without knowing little more than the chemical names of a very few substances. You know nothing of chemistry, it may be, and as little of law; yet you will go to law, and learn some of its terms by a dear-bought experience. The law terms are harder to learn than the chemical terms.

NAMES OF SUBSTANCES FOUND IN PLANTS.

Now I fear that some persons, who have followed me thus far, will shut up the book. It is, say they, all stuff, book farming, and beyond us. If one may not understand what manure is without this learning, we may as well begin where our fathers ended, and that was where our forefathers began ages ago. By a little law, however, picked up as a juryman, or witness, selectman, town clerk, justice of the peace, yea, perhaps, hearing an indictment read, men do come to understand what a lawyer means when he talks. So, too, by a little chemical talk, a man may learn what a chemist means when he talks of oxygen, hydrogen, nitrogen, chlorine, and carbon; potash, soda, lime, (ah, these are old friends, the very names make us feel at home again,) alumina, magnesia, iron, manganese, and silex, sulphur, and phosphorus. Here is a long list. Long as it is, perhaps it will be thought worth learning, when you are told, that these are the names of all the substances found in plants, every substance which they want. Out of these is made every plant. Every part of every plant, from the hyssop on the wall to the mountain cedar, contains some or all of these. Be not disheartened. Look over, reader, the list again carefully, see how many are old names of things which you know. Of the fifteen, you know nearly one half by name and by nature. These are potash, soda, lime, magnesia, iron, sulphur. Perhaps you will add, that you know carbon is coal, or rather coal carbon. You have heard from some travelling lecturer at your town Lyceum, that oxygen and hydrogen together form water; that oxygen and nitrogen form the air you breathe; that nitrogen and hydrogen form ammonia, or sal volatile, which gives the sharp smell to the smelling bottle. Besides, the thing has been said so often that you must have heard it, that chlorine, the substance which bleaches in bleaching salts, united to soda, makes common salt; or if chlorine is united to ammonia, sal ammoniac is formed. Now by changes and combinations among these fifteen things, nature makes everything we find in plants. Many of these are invisible as is the air. The substance called chlorine perhaps you have never seen, but if you ever smelt it you will never forget it. It is often smelt in a piece of bleached cotton, when opened in the shops. It gives the smell to bleaching powder used to disinfect the air, during cholera and other diseases. If you could see it, it would appear merely a faint yellowish-green air. It is all-powerful on vegetation. As it forms a part of common salt, say half of its weight, we may dismiss the further consideration of it, by saying, that, in some shape or other, chlorine is universally diffused in soil and plants.

CHEMICAL SUBSTANCES DEFINED.

THE list above may be divided as follows:—First, the airy or volatile; secondly, the earths and metals; thirdly, the alkalies; fourthly, the inflammables. Only the third and fourth divisions require to be explained or defined. The substances called potash and soda are termed alkalies. They are said to have alkaline properties. Touch your tongue with a bit of quicklime: it has a hot, burning, bitter taste. These are called alkaline properties. Besides these, they have the power of combining with and taking the sours out of all sour liquids or acids; that is, the acid and the alkali neutralize each other. This word alkali is of Arabic origin; its very name shows one of the properties of alkalies. *Kali* is the Arabic word for bitter, and *al* is like our word *super:* we say fine and superfine; so kali is bitter; alkali, superlatively bitter, or truly, alkali means, the "dregs of bitterness."

I wish, reader, for your own sake, as well as my own, that you should fix in your mind what I have said about alkali and alkaline properties. Alkali is a general term. It includes all those substances which have an action like the ley of wood ashes, which you use for soap making. If this ley is boiled down dry, you know it forms potash. Now lime, fresh slacked, has the alkaline properties of potash, but weaker, and so has the calcined magnesia of the shops, but in less degree than lime. Here we have two substances, earthy in their look, having alkaline properties. They are called, therefore, alkaline earths. But what we understand chiefly by the term alkalies, means potash, soda, and ammonia. Potash is the alkali of land plants; soda is the alkali of sea plants; and ammonia is the alkali of animal substances. Potash and soda are fixed; that is, not easily raised in vapor by fire. Ammonia always exists as vapor unless fixed by something else. Hence we have a distinction among alkalies which is easily remembered. This distinction is founded on the source from which they are procured, and upon their nature when heated. Potash is vegetable alkali, derived from land plants; soda is marine alkali, derived from sea plants; ammonia is animal alkali, derived from animal substances. Potash and soda are fixed alkalies; ammonia is a volatile alkali. Potash makes soft soap, with grease, and soda forms hard soap. Ammonia forms neither hard nor soft; it makes, with oil, a kind of ointment, used to rub a sore throat with, under the name of volatile liniment. But though there be these three alkalies, and two alkaline earths, I want you to fix in your mind, reader, that they all have common properties, called alkaline, and which will enable you to understand their action, without more ado about their chemistry.

The inflammables, or our fourth division, are sulphur and phosphorus; both used in making friction matches. The phosphorus first takes fire, by rubbing, and this sets the sulphur burning. Now, the smoke arising from these is only the sulphur and phosphorus united to the vital part of the common air. This compound of vital air, or oxygen, as it is called, and inflammables, forms acids, called sulphuric and phosphoric acids. So if you burn coal, or carbon, it is well known you form fixed air, or carbonic acid. That is, by burning, the coal or carbon unites with the oxygen or vital part of common air, and forms carbonic acid. The heavy, deadly air, which arises from burning charcoal, has all the properties of an acid. And now let us see what these properties are. All acids unite or combine with the alkalies, alkaline earths, and the metals. When acids and alkalies do thus unite, they each lose their distinguishing properties. They form a new substance, called a salt. It is very important you should fix well in your mind this definition of a salt. You are not to confine your idea of a salt to common salt. That is a capital example of the whole class. It is soda, an alkali, united to an acid, or chlorine; or, to speak in the terms the most intelligible, to muriatic acid. So saltpetre is a salt. It is potash united to aqua-fortis. Yet in saltpetre you perceive neither potash nor aqua-fortis. These have united, their characters are neutralized by each other. They have formed a neutral salt. Our list of substances found in plants is thus reduced from things which you did not know, to things which you do know; and so we have saved the trouble of learning more of their chemistry.

We have reduced the airy or volatile into water, formed of oxygen and hydrogen; or volatile alkali, formed of nitrogen and hydrogen; or into acids, as the carbonic, formed of oxygen and carbon—as the sulphuric, formed of oxygen and sulphur—as the phosphoric, formed of oxygen and phosphorus; and having thus got water and acids, these unite with all the alkaline, earthy, and metallic bodies, and form salts. To give you new examples of these, I may mention Glauber's salts and Epsom salts. Glauber's salt is formed of soda and sulphuric acid; Epsom salts, of magnesia and sulphuric acid; alum, of alumina, or clay and sulphuric acid; green vitriol, of iron and sulphuric acid; white vitriol, of zinc and sulphuric acid; plaster of paris, of lime and sulphuric acid; bones, of lime and phosphoric acid; chalk and limestone, of lime and carbonic acid. These are all examples of salts; that is, an acid, or a substance acting the part of an acid, united to an alkali, metal, or earth.

ANALYSIS OF PLANTS.

We have thus gone over, in a very general way, enough of chemistry for any one to understand the chemical nature of manure. You see, reader, that with common attention, bestowed for an evening's reading, one may learn these chemical terms and their meaning. And now, having learned this first lesson, let us review the ground gone over, and fix, once and for all, these first principles in our minds. Let us do this, by a practical application of the knowledge we have gained. Let us analyze a plant. Do not be startled at the word. To analyze, means to separate a compound substance into the several substances which form it. This may be done by a very particular and minute, or by a more general division. It may be done for our present purpose, by separating the several substances of a plant into classes of compounds. You are already chemist enough to undertake this mode of analysis; in truth you have already done it, again and again. For our purpose, the ancient chemists had a very good division of all matter into four elements; fire, air, earth, and water. Now, by fire you separate plants into the other three elements. You are, reader, though perhaps you do not know it, somewhat of a practical chemist. Whenever you have burned a charcoal pit, what did you? You separated the wood into air, water, and earth.

You drove off by heat or fire the airy or volatile parts of the plant: you left its carbon, or coal; if you had burnt this, you would have left ashes. Now these ashes are the earthy parts of plants. If you burn a green stick of wood, you drive off first its water and volatile parts, which form soot. You burn its carbon, and leave its ashes, or salts. So that by simply burning, you reduce the substance or elements of plants to water, carbon, salts. All plants then, without exception, contain the several substances in our list above, as water, carbon, and salts. To apply this knowledge to manure, we must say a word on the form in which some of these, which we call the elements of plants, exist in them. The sap is water; it holds dissolved in it some salts of the plant. This sap, or juice, forms a pretty large proportion of the roots, say seventy-five to eighty parts in one hundred, of potatoes, turnips, beets, &c. This may be called the water of vegetation. If we dry beet root, or any other plant, we merely drive off this water of vegetation. Now what have we left? To go back to our process of analysis, let us char the dried root. We drive off more water and volatile parts. This water did not exist, as such, in the plant. It existed there as hydrogen and oxygen gas. Now this word gas is a chemical term, and it means any substance in vapor, which cannot be condensed into a liquid or solid, at common temperatures. Different gases may unite, and so become solids or liquids. Steam is not gas, for it is the vapor of water, and immediately returns to the state of water, below 212°. Perfect steam is invisible, so are most gases. The air we breathe is composed of two gases, oxygen and nitrogen. We do not see them; we cannot, by cooling or compression, make air take other shape than invisible air. This is the general property of gas, as distinguishod from vapor or steam. Oxygen and hydrogen, in plants, exist in just the proportions to form water, but we do not know that they are united in these proportions. We have compelled them to unite, by heating the substance or root. The carbon is by this same process consumed, and, you know, has thus formed carbonic acid. Besides this, a portion of the carbon unites with some of the hydrogen of the plant. This forms light, inflammable air. Now you may collect this light, inflammable air, in any stagnant water where plants are decaying. Decay gives exactly the same products as are formed in making charcoal. Decay is only slow combustion, or burning; no matter whether we char the plant or leave it to decay, we obtain exactly the same products as we did by our analysis, that is, carbon and salts.

MOULD.

But because there is not heat enough, we leave by decay a portion of the hydrogen and oxygen still united to the coal. A slow *mouldering* fire leaves products more like those of decay. Decay is a slow, mouldering fire; hence the products of the decay of plants are very aptly termed *mould.* It is the product of a mouldering fire; that is, an imperceptible union of the oxygen of the air with the carbon of the plant. A union so slow, that it gives out neither heat nor light. And yet it is in its results, the same as if fire had actually been seen and felt. Mould contains, then, a part of the carbon, oxygen, and hydrogen, or, if you like the terms better, mould of soil consists of the water and coal and salts of the plants. Mould is truly manure. If the mould of soil, as it has thus been defined, were separated from the earthy portions of soil, it would deprive that soil of the power of growing crops. Here, then, we come to a broad distinction between soil and manure. The soil is the earth on which plants grow. The mould is the manure of that soil. The soil is the earthy—the mould, that is, the carbon and salts, together with the elements of water, are the vegetable part of arable land. But though the earthy part, the soil, as it is usually called, acts as a support, on which plants grow, it does not play a merely mechanical part. It has a distinct, decided, and important action upon the manure. This action is chiefly chemical; and the fact that soils and manures do mutually affect the growing plant, is proved by the circumstance, that the first plants which grew derived their salts from the earth.

MANURES—THEIR ACTION, ETC.

But this chemical action of soil does not belong to the present discussion. We can understand what manures are, without deciding how they act. We can theorize and guess about the how of their action, when we have learned what they are. That is chiefly what the farmer wants to know. He wants to know what manure is, and what is likely to act as a manure. To these points, we shall confine our present remarks. Pointing out the great principles applicable to all manures, the nature of soils, and the manner in which they affect manurês, must be left for another essay. The vegetable or manure part of soil alone, is now to be considered. Consider, now, reader, the great results to which our analysis has led us; that a slow, mouldering fire gives us the same products as are formed by decay; that this is only a slow, mouldering fire, and that mould, its product, is the natural manure of plants. It follows, that whatever substance produces mould, that is, water, carbon, and salts, may be used instead of this natural manure. Among the salts found in mould, some are volatile, and are easily dissolved by water. Others are fixed, that is, not evaporating easily, or not at all, and are quite insoluble in water. Now the first, or volatile and soluble, first act when used in manure. They act quick, and are quickly done. The fixed and insoluble act slower, they last longer. The volatile act in the early stages of growth, the fixed in the later periods. The great difference in the action of manures, depends almost entirely upon the salts which they contain. These are the most important and essential. It is not so much the vegetable mould of manure which you want, as the salts which it contains. This is a well-settled principle. Land which has undergone the skinning process, old, worn-out, and run-out land, still contains a very large portion of vegetable matter; the coal or carbon of mould without its salts. Give this worn-out land salts, and you may, by these alone, bring it back not only to its first virgin freshness, but you may even by salts alone make it fairer and richer than it was before man ever cultivated it.

Too much stress has been all along laid upon the kind of soil. Go now to "Flob," in West Cambridge; no better farms or farmers, look the world through. Ask any of these practical men, whether the sandy and gravelly soil of Old Cambridge Common, or even of Seekonk Plain, can be made to bear as rich crops as their land? They will tell you yea. If your land will hold manure, muck it well and it will be as good. Now, this holding of manure belongs to the subject of soils, and throwing that out of consideration, it is found that even lands which do not hold manure, which have been worn out and exhausted by cropping, hold yet a great deal of insoluble coal of mould. They want salts, and something which will make this inert, dead vegetable matter of the soil active. The mould is active in proportion as it is more or less dissolved by water. Mould consists of two parts; one is dissolved, though only in a slight degree, by water; the other is not dissolved by water. Some substances, however, do render mould very easily dissolved by water. Hence, if you reflect a moment on these facts, it will be seen that mould itself, being valuable in proportion to the ease with which water dissolves it, that whatever substance so enables mould to dissolve, may be added to it, and thus increase its value. Now the things which do this are the alkalies, soda, potash, and ammonia. These principles being well settled, we may enter on the consideration of each different manure. They will be valuable in proportion to the quantity and kind of salts each contains, added to the power they may have of producing by their decay substances which make their mould soluble. Now this last property, that is, the property of producing a substance which makes mould soluble, depends wholly upon the nitrogen of the manure. This nitrogen, in the process of decay, becomes volatile alkali or ammonia. The word ammonia will occur so often in the present discussion, that we should endeavor to fix some definite idea to it. You need not, reader, be acquainted with all its chemical properties. I suppose every man who will be likely to read these remarks, has smelled ammonia. It has been already said, that it gives the peculiar pungent smell to the common smelling bottle.

This is volatile ammonia. It is always formed when animal or vegetable bodies decay.

It has been already said, and is now repeated, in order that it may never be forgotton, that ammonia is formed by the union of hydrogen and nitrogen. Hydrogen and nitrogen, two airs, nitrogen forming four fifths of the air we breathe; let that be borne in mind, and without going into the chemistry of ammonia further, or the mode of calculating how much ammonia a pound of nitrogen will make, it may be laid down, and must be remembered, too, that every pound of nitrogen may be called two and a half pounds of sal volatile, or smelling salts, of the smelling bottle. Two and a half pounds of volatile ammonia formed from one pound of nitrogen. If, then, we can determine, as chemistry may, how much nitrogen exists or forms a part of manure, two and a half times that will be the ammonia of that manure. If then the vegetable part of manure is, as we have said, valuable and active, in proportion to its degree of being dissolved by water, then, as ammonia gives it this easy solubility, we may safely say, that the quantity of nitrogen in manure is the measure of the value of its vegetable part. One thing must be guarded against, not to place from this view the whole of the value of manure upon its ammonia. Remember that manure consists of carbon, water, and salts. The whole are equally essential to its action. There is no eye, nor ear, nor foot, nor hand in manure, which may say to the other members, "I have no need of thee." The whole act together; but it is not to be doubted, that ammonia is the heart of manure, and keeps up the healthy circulation among the other members.

SECTION II.

SHOVELLING OVER THE COMPOST HEAP.

THE above remarks may be called our compost heap. It must be well shovelled over. You must, reader, before you cart it out and spread it, understand well what this compost contains. Now just let me turn over a few shovelfuls, and fork out the main points to which I wish to call your attention.

1st. That all plants find in stable manure everything they want.

2d. That stable manure consists of water, coal, and salts.

3d. That these, water, coal, and salts, consist in all plants of certain substances, in number fifteen, which are called,

1. Oxygen, 2. Hydrogen, 3. Nitrogen, 4. Carbon, 5. Sulphur, 6. Phosphorus, 7. Potash, 8. Soda, 9. Lime, 10. Magnesia, 11. Alumina, or clay, 12. Iron, 13 Manganese, 14. Chlorine, which last, as we have said, forms about one half the weight of common salt, 15. Silex. And if you always associate with the word chlorine, the fertilizing properties of common salt, you will, perhaps, have as good an idea of this substance as a farmer need have, to understand the action of chlorine.

4th. These fifteen substances may be divided into four classes.

(1.) The airy or gases, oxygen, hydrogen, nitrogen, and chlorine.

(2.) The earths and metals, lime, clay, magnesia, iron, manganese, and silex.

(3.) The alkalies, potash and soda.

(4.) The combustibles, carbon, sulphur, and phosphorus.

You may be surprised that I have not turned up ammonia, but this exists in plants as hydrogen and nitrogen.

5th. The term salt includes a vast variety of substances, formed of alkalies, earths, and metals, combined with acids. Fix well the meaning of this term in your mind, and remember the distinction pointed out, that some salts are volatile, and act quick in manure, and others are fixed, and act slower.

6th. When plants die or decay, they return to the earth or air these fifteen substances. Those returned to the earth form mould, which, thus composed of carbon, salts, and water, is natural manure.

7th. Mould consists of two kinds, one of which may be, and the other cannot be dissolved by water. Alkalies put it into a state to be dissolved, and in proportion as it is dissolved, it becomes valuable as a manure.

8th. If then manure contains only water, carbon, and salts, any substance which affords similar products may be substituted for it. Hence we come to a division of manures into natural and artificial. The consideration of these is the carting out and spreading of our compost. And we shall first consider in detail the natural manures.

That is, those which are furnished us by the dung and urine of animals, and the manure or mould formed by the decay of animal bodies or plants. These are truly the natural manures, consisting of water, mould, and salts. This is all that is found in cattle dung. This being premised, we may divide manures, reader, for your more convenient consideration, not by their origin, but by their composition. We may divide manures into these three classes: First, those consisting of vegetable or animal matter, called mould; Secondly, those consisting chiefly of salts; Thirdly, those consisting of a mixture of these two classes. And, beginning with the last first, we will now proceed to their consideration.

SECTION III.

CARTING OUT AND SPREADING.

The general chemical information set forth in the preceding sections will be of no service to you, reader, if it conducts you not beyond the result arrived at in the close of the last section, that cattle dung is composed of water, mould, and salts.

You want to know what salts, and how they act. If you understand this, you may be able to say beforehand, whether other things, supposing their nature understood, can take the place of the mould and salts.

The mould, then, of cattle dung, as of all other mould, contains the following substances:—

The water consists of oxygen and hydrogen.

The mould consists of carbon, oxygen, hydrogen, nitrogen, and ammonia.

Thus it is seen, that the mould contains all the substances found in the first class into which the elements of plants were divided. The salts contain the sulphur, phosphorus, and the carbon as sulphuric, phosphoric, and carbonic acids, and the chlorine, as muriatic acid, or spirits of salt.

The acids, formed of the elements of the fourth class of the substances entering into plants, are combined with those of the second and third classes, namely, the potash, soda, lime, clay, magnesia, iron, and manganese. Here, then, we have all the elements of plants, found in cattle dung. Let us detail their several proportions. We have all that plants need, distributed in cattle dung, as follows:—

In 100 lbs. of clear cattle dung are,

Water,	83.60
Mould, composed of hay,	14.00
Bile and slime,	1.275
Albumen, a substance like the white of an egg,	0.175
Salts, silica, or sand,	0.14
Potash, united to oil of vitriol, forming a salt,	0.05
Potash, united to acid of mould,	0.07
Common salt,	0.08
Bonedust, or phosphate of lime,	0.23
Plaster of Paris,	0.12

Chalk, or carbonate of lime, . .	0.12
Magnesia, iron, manganese, clay, united to the several acids above,	0.14
	100.00

SECTION IV.

OF THE ACTION OF MOULD IN CATTLE DUNG.

Here, then, we have cattle dung with its several ingredients spread out before us.

We have now to study its action. We need here consider only the salts and mould. The water is only water, and has no other action than water. The mould includes the hay, for that has by chewing, and the action of the beast's stomach, lost so much of its character, that, mingled with the slime and bile, &c., it more rapidly decays than fresh hay would, placed in similar circumstances. During this act of decay, as you have already learned, the volatile parts of the mould are given off in part. These escape as in burning wood, as water or steam, carbonic acid, and ammonia. In consequence of this slow mouldering fire or decay, the manure heats. Here then we have three very decided and important actions produced by the vegetable part or mould of cattle dung. First, carbonic acid is given off; second, ammonia is formed; third, heat is produced. Let us now consider each of these, and their effects.

Firstly, the great action of the carbonic acid is upon the soil, its earthy parts. It has the same action on these, that air, rain, frost, have; it divides and reduces them. It not only reduces them to powder, but it extracts from the earth potash, and the alkalies. This is a very important act, and shows why it is necessary that decay, or fermentation, should take place in and under the soil among sprouting seeds and growing roots, in order that they may obtain from the soil the salts they want.

If well-rotted manure contains abundance of these salts, ready formed in its mould, then there will be less necessity of this action of carbonic acid. But here again it must be remembered, that this abundance of salts, ready formed in mould, can be produced only at the expense of great loss by fermentation of real valuable parts; for,

2d. The next great action of the mould of cattle dung is, to produce or form ammonia. This plays a threefold part: its first action is, to render the mould more soluble; this action it possesses in common with the fixed alkalies—potash and soda. All the alkalies put a large, but undefined portion of mould, into a state fit to become food for plants. The second action of ammonia is this, it hastens decay. It is the bellows, we may say, kindling the slow mouldering fire. The third action of ammonia is, to combine with any free acids, such as vinegar, or even an acid formed of mould itself, but especially with aqua-fortis, or nitric acid, which is always produced where animal or vegetable matters decay. This is a highly important fact. The result of this action, the production of ammonia and aqua-fortis, during the formation of mould, is, that a kind of saltpetre is thereby produced. That is, the ammonia and aqua-fortis unite, and form a salt, with properties similar to saltpetre. But we want the first and second action of ammonia to occur, before the third takes place. Consider now, reader, whether a more beautiful and effectual way can be devised, to hasten decay, and render mould more fit for nourishing plants, than this which nature has provided. The ammonia is volatile. It remains, not like potash and soda, where it is put, incapable of moving unless dissolved by water, but ammonia, like steam, pervades every part. It is as expansive as steam. Heated up by the slow mouldering fire of decay, it penetrates the whole mass of mould. It does its work there.

What is that work? It has already been told. But, if it finds no acid to combine with, it then unites with the mould itself. It is absorbed by it.

The mould holds it fast; it stores it up against the time when growing plants may need it. Now it is only where the abundance of ammonia produced satisfies these actions of hastening decay, making mould soluble, and filling its pores without combining with it, that the formation of saltpetre takes place. So where animal matters, which are the great source of ammonia, decay, there we may expect all these actions to occur. How important, then, is that action of mouldering, which produces ammonia. If, reader, you will reflect upon the consequences of this action, you will at once see, that if the mould is in too small a quantity to retain the ammonia, it may escape. If by a wasteful exposure, you allow your mould to dissipate itself in air, as it certainly will, you not only incur the loss of that part of the mould, but you diminish at the same time the chance of keeping the ammonia which has been formed. No doubt all cattle dung exposed to air, forms more ammonia than it can retain. Hence the necessity and the season of forming composts with this substance. "Keep what you have got and catch what you can," must never be lost sight of in manure. The third action of mould is the production of heat. Little need be said upon this. That a slight degree of heat hastens the sprouting of seeds, you well know. That different manures produce different degrees of heat, that some are hot, some cold, you well know, and adapt your seed and manure to each other. The degree of heat depends upon the rapidity with which decay occurs. And this is affected by the quantity of ammonia which each manure can afford. The great point, to which your attention should be directed, when considering the power of mouldering to produce heat, is, that it shall not go so far as to burn up your manure, just as hay will heat and take fire.

SECTION V.

OF THE ACTION OF THE SALTS OF CATTLE DUNG.

Here it is we find ourselves thrown on a sea of opinions, without chart, compass, or pilot, if we trust to the conflicting theories which have been set up for landmarks and lighthouses. Let us, therefore, reader, trust to ourselves, aided by the little chemistry we have learned from the preceding remarks about the composition of salts.

I have endeavored to impress on your memory, that the term salt is very comprehensive. But then to encourage one, it is also to be remembered, that salts are compounds of alkalies, earths, and metals with acids. Now the earths, alkalies, metals, may be united to each of the known acids, (and their name is legion,) yet you may not, by this change of acids, alter the nature of the earth, alkali, or metal. That always remains the same; every time you change the acid, you alter the character of the salt. Thus soda may be united to oil of vitriol and form Glauber's salt, or to aqua-fortis and form South American saltpetre, or to muriatic acid and form common table salt. The soda is called the base, or basis, of this salt: that is always soda; you do not change its character by changing the acid. To give another example, lime may be united to carbonic acid and form chalk, or marble, or limestone, or it may be united to oil of vitriol and form plaster of Paris, or to phosphoric acid and form bonedust. Now, in each case, the base of the salt, that is, the lime, remains unchanged; but, changing the acid, we change the nature of the salt, and of course its effects will be different.

Now it is plain, that where the base of the salt remains the same, that will always act the same, but different effects will be produced by different acids. Each base acts always one way, but each has an action similar to every other. Each acid acts also one way, but each has an action distinct from every other; impress this on your mind. Reflect upon it a moment, and you will perceive that salts produce different effects, according to the nature of their acid. Now this may be illustrated thus: You take every day, probably with your every meal, common salt; that is, soda, a base, united to muriatic acid. Your digestion and health are all the better for it. You give your cattle a little salt. It does them good. Suppose now you change the acid of that salt, leaving soda, its base, in the same quantity you daily take. Instead of the muriatic, suppose you substitute the nitric acid, or, what is the same thing, suppose you use saltpetre from Peru, instead of common salt. You need not be told, that you would poison yourself and your cattle by so doing. You can drink, I dare say you have, cream of tartar punch. You feel the better for it. It is refreshing, cooling, opening. Now cream of tartar is a salt of potash; it is potash and tartaric acid. You have a fever. Your doctor gives you a sweat with Silvius's salt; that is, acetate of ammonia, a salt composed of that and vinegar; or you take, perhaps, an effervescing draught, formed of lemon juice and pearlashes. All does you good. But suppose now you change these cooling, vegetable acids for a mineral acid, say oil of vitriol. You may not take potash, united with a dose of oil of vitriol equivalent to the tartaric acid in the cream of tartar, without serious injury. So is it, reader, in farming, the acids of some salts are not only harmless, but beneficial to plants; others are actual poisons.

In the first case, salts help to nourish plants, as common salt helps to nourish yourself; in other cases, they poison plants, just as they would impair your constitution, perhaps kill you. But it is to be remembered, as in our own case, even those that poison, in a small dose become medicines, so, in plants, a small dose is not only good, but truly essential. Now if we divide the acids into two classes, the nourishers and the poisoners, such will also be the nature of the salts. When we therefore attempt such a general division of the salts, it may be said that all the acids derived from the vegetable kingdom are harmless; so are the acids called mineral, yet whose components are, in part, like those of the vegetable acids; for instance, aqua-fortis, or nitric acid. But the true mineral acids are poisonous; such are oil of vitriol and spirits of salt. One thing is here to be borne in mind. It must never be out of sight, in trying to understand how salts make plants grow. You cast your salt upon the ground; it lies there; no action occurs. It rains; your salt is dissolved and disappears; it seems to do no good. Cast your salt now among sprouting seeds and growing roots; here is life. Well now, life is just as much a power or force as electricity is. It exerts its force, no matter how; that is quite another consideration. I say, life exerts its force here to separate the acid and the base of a salt, just like a chemical force. We can and do separate the components of salts by other substances; nay, we do it by electricity alone.

Now this is all which it is necessary for you to know, and to understand about this action of plants upon salts; it does disunite the components of the salts. What is the consequence? The alkali, earth, and metal act as such, the same as if no acid was present. The acid also acts by itself: if it is a nourisher, it helps the plant; if it is a poisoner, it hurts it. It produces either a healthy, green crop, the effect of alkali, or a stunted, yellow, sickly plant, the effect of acids. Now neutralize this acid, kill it. You see your crops start into luxuriance, and reap where you have strewed. So much for illustration. Let us now apply this view of the action of salts to those contained in cattle dung. In the first place, we have salts of potash, of soda, of lime; these are the most abundant and active. Then we have salts of iron, manganese, of clay, and magnesia. These last, existing in small proportion, may be thrown out of the account, bearing in mind, however, that, though we set these aside, a plant does not; they enter equally with the others into its composition.

Let us begin with the salts of potash. It is found combined in cattle dung, first, with a vegetable acid, the acid of mould. It is a nourisher of plants. Secondly, with sulphuric acid, or the acid of sulphur, called oil of vitriol. This is one of the poisoners, existing only in small proportion in cow dung; it ministers to the wants of a healthy plant. The same is true of the common salt, or the muriate of soda of dung. If it existed in larger quantities, it would poison the plants to which it might be applied.

The next salts are those of lime, phosphate and sulphate of lime, or lime united to sulphuric and phosphoric acid, forming plaster and bonedust. The acids here, if abundant, would have a decided bad influence, they are poisoners; but the carbonic acid, in the carbonate of lime, is a nourisher. Now, from the small quantity in which these all exist in cattle dung, they act only beneficially. But if you apply a great excess, even of cattle dung, you may be sure of an unfavorable result. It will be produced by the acids of those salts which we have called poisonous.

To continue our remarks on the acids of salts of dung, it is to be observed, that they act also upon the soil. They decompose that. That is, they extract from the soil alkalies, or other substances, like those in the original salt. Now though applied, as they must be, in very small doses in cattle dung, yet, because of their decomposing action on soil, they continually renew themselves, they last till all their acid is taken up to supply the wants of growing plants.

Let us now, reader, if you understand how the acids of the salts of dung act, turn to the bases or the alkalies and metals and earths of these salts. What is their action? What purpose do they serve in dung applied as manure? First, they enter into and form a part of the living plant, they form a part of its necessary food, as much as do the constituents of mould. Secondly, when these alkalies and metallic bases are let loose, by the disuniting power of a growing plant, then they act as alkalies upon mould. They hasten decay, render mould more soluble, fit it to become food for plants. This account of the action of mould and salts in cattle dung may appear to you, reader, long and hard to be understood. I do request you not to pass it over on that account. A patient reading, perhaps some may require two or more readings, will put you in possession of all you need know, to understand the why and the wherefore of the action of mould and salts of whatever manure may be used. What has been said of the action of mould and salts in cattle dung, is equally applicable to all manures. If, then, you bend your bones to this subject, and master it, your labor of understanding the action of other manures will be reduced to the mere statement of the several substances which they may contain. We therefore proceed to point out other manures, composed of the droppings of animals.

SECTION VI.

OF NIGHT SOIL, HOG MANURE, HORSE AND SHEEP DUNG.

THESE have not all been analyzed with the same degree of care and as often as has cattle dung; some, as, for instance, night soil, have been examined thoroughly but once. Now it is not quite fair to base our reasoning upon these single analyses, and say that this or that manure contains this or that salt in greater or less quantity than another.

The quantity and kind of salts are materially affected by several circumstances, which will be considered in the next section. An analysis, made when the animal is fed and worked one way, will vary from the result which would be obtained when the circumstances are varied. It is, therefore, quite useless, in the general consideration of the composition of manures, to enter upon the details of each. General results, general expressions of facts, are sufficient for understanding the nature of animal droppings. It is well ascertained, however, that all these droppings of various animals contain essentially the same salts as does cattle dung. They all contain portions of each of the substances which form plants. It will be enough for the purpose of this essay, to present to your eye, reader, a table, showing the proportions of water, mould, and salts, which the dung of yourself and your stock presents.

	Water.	Mould.	Salts.
Night soil and hog manure,	75.3	23.5	1.20
Horse dung, . . .	71.2	27.0	0.96
Sheep dung, . . .	67.9	22.5	3.06

SECTION VII.

OF THE CIRCUMSTANCES WHICH AFFECT THE QUALITY AND QUANTITY OF ANIMAL DUNG.

THAT we may reduce to some general principle, easily understood and easily remembered, the facts scattered up and down, among the mass of writers and observers, about the different quality of manure afforded by different animals, or the same animals at different times, let me, reader, request your company while I walk into a new department of your chemistry. You may not understand the reasons of this difference in manures—why, for instance, fattening cattle give stronger manure than working oxen—without going a little into the mode how animals are nourished. The whole may be stated in plain terms thus: All food serves two purposes. The first is to keep up the animal heat, and this part of food disappears in breathing or in forming fat; that is, after serving its purpose in the animal body, it goes off in the breath or sweat, or it forms fat. It is so essential to the action of breathing, that we will term it food for breathing, or the breathers. The second purpose answered by food is, to build up, sustain, and renew the waste of the body.

Now all this is done from the blood. To form blood, animals must be supplied with its materials ready formed. They are ready formed in plants; and animals never do form the materials for making blood. We may, therefore, term this kind of food the blood formers. We have, then, two classes of food; the breathers and the fat formers, and the blood formers. If we look to the nature of these different classes, we find that sugar, starch, and gum are breathers. Now there are three principles found in plants, exactly and identically the same in chemical composition with white of egg, flesh, and curd of milk. Now these three principles, exactly alike, whether derived from animals or from plants, are the only blood formers. I shall not, reader, tax your attention further upon this subject, than to say and to beg you to remember these important facts: First, all food for breathing and forming fat contains only these three elements, oxygen, hydrogen, and carbon. Secondly, all food for forming flesh and blood, in addition to these, contains nitrogen.

This is the gist of the whole matter, so far as relates to manure. Bear in mind, as you go on with me, reader, this fact, that of all the food animals take, that alone which can form flesh and blood contains nitrogen. The door is now open for explaining why age, sex, kind of employment, difference of food, difference of animal, can and do produce a marked difference in the value of different manures. And first, let us consider how the quantity is affected; this depends on the kind of food. The analysis of cattle dung which has been given is that of cows fed on hay, that is, herd's grass, red top, &c., or what is usually termed English hay, potatoes, and water. The cattle kept up the year round; an animal, so treated, consumed in seven days,

Water, ...	611 lbs
Potatoes, ...	87 "
Hay, ...	167 "

During this time, she dropped clear dung 599 lbs., or very nearly a bushel of dung a day. Every attention was here paid to accuracy of measurement and weight. The annual amount of dung from one cow exceeds by this account that which is usually assigned. But, as it is a matter of some importance for the farmer to estimate what the produce of his stock may be in dung, the following statement, containing the results of a large establishment, will probably give that average.

At this establishment, the cows were kept up the year round for their dung. It was collected for use free from litter, and measured daily into large tubs of known capacity. The average number of cows kept was fifty-four for nine and a half years. During that time, they consumed of beets, meal, and pumpkins, brewery grains, cornstalks, turnips, potatoes, carrots, and cabbages, 942,436 lbs., giving an average of green fodder, for each cow per year, 1,837 lbs. Average consumption of hay for each cow per annum, 8,164 lbs. The total dung for nine and a half years was 120,520 bushels, or per cow per annum, 235 bushels. This gives a daily consumption of green food, 5 lbs.

and 22 lbs. of hay per cow, and two and a half pecks of dung per day, or about 56 lbs. per cow.

But according to some experiments, made to determine how much the quality of the food affected the quantity of dung, it appears that the solid and fluid excrements, partially dried, were, compared with the food, as follows:—

	Cattle. lbs.	Sheep lbs.	Horses. lbs.
100 lbs. of rye straw gave dung,	43	40	42
" " hay, " "	44	42	45
" " potatoes, " "	14	13	
" " mangel-wurtzel, "	6		
" " green clover, "	9⅓	8½	
" " oats, " "		49	51
" " rye, " "			53

My own experiments on this subject gave for 100 lbs. of hay and potatoes as above, estimating both as dry, or free from water of vegetation, 32.9 lbs. dung, and this estimated as dry is reduced to 5.6 lbs., or 26 lbs. of dry food gave 14 lbs. of dry dung. But as a general fact, we may say, that well-cured hay and the grains give one half of their weight of dung and urine; potatoes, roots, and green grass, about one tenth. It will be easily understood why the quality of food should affect the quantity of dung. The more watery, the less in bulk is voided, because there is actually less substance taken. And as the animal requires this to form his flesh, and blood, and fat, and to keep up his breathing, so will he exhaust more completely his food. More going to support him, less is returned by the ordinary channels. So when much vegetable fibre exists, as in chopped straw and hay, then, as it goes but little way toward supporting breathing or forming blood, a greater bulk is rejected. In grains, on the contrary, which afford much of all that the animal requires, less is extracted and more voided These circumstances are intimately connected with

THE QUALITY OF THE DUNG.

It is affected, first, by the season; second, by the age; third, by the sex; fourth, by the condition; fifth, by the mode of employment; sixth, by the nature of the beast; seventh, the kind of food.

1st. The season. It is, because digestion is worse in summer than in winter, a general fact, that summer manure is best. And where cattle are summer soiled, it is said the manure is worth double that from stall-fed winter cattle. I do not think much is to be attributed to the worse digestion in summer; but the cause of this great difference in value is to be found in the fact, that soiled cattle generally get a large proportion of blood-forming food.

The wear and tear of their flesh is little, and hence, requiring little of their food to keep up their flesh, a greater portion goes off in dung, which thus becomes rich in ammonia. The green plants, rich in nitrogen, afford abundance for milk, which, being rich in all the elements of cream, should afford large returns of butter.

2d. Age. From the fact, that young and growing animals require not only food to form flesh and blood to repair the incessant waste and change taking place in their bodies, as in older animals, but also a further supply to increase the bulk of their frame, it is evident that their food will be more completely exhausted of all its principles, and that also less will be returned as dung. All experience confirms this reasoning, and decides that the manure of young animals is ever the weakest and poorest.

3d. The sex. This is one of the most powerful of the causes which affect the strength of dung. From the remarks which have been already made, and which I trust, reader, are now fresh in your memory, of the important part acted by nitrogen in dung, it must be plain why sex should exercise such influence.

Firstly, in all food, as we have explained, that only which contains nitrogen can form flesh and blood, or substances of similar constitution; that is, requiring a larger proportion of nitrogen, as milk. Hence, an animal with young, that is, a cow before calving, requires not only materials for its own repair, but to build up and perfect its young. Hence the food will be most completely exhausted of its nitrogen, and consequently the dung become proportionably weaker.

Secondly, the young having been formed, then milk is required for its sustenance. Milk contains a large proportion of nitrogenous or blood-forming elements, and so the cause which originally made the dung weak, continues to operate during all the time the animal is in milk. Sex, then, it is evident, affects materially the quality of the dung.

4th. The condition. If the animal is in good condition, and full grown, it requires only food enough to supply materials to renew its waste.

Hence the food, supposing that always in sufficient quantity, is less exhausted of its elements, than when the animal is in poor condition. In the last case, not only waste, but new materials must be supplied. If the animal is improving in *flesh*, (and here, reader, I would have you bear in mind the distinction between flesh and fat,) if the animal is improving in flesh, then the manure is always less strong than when he is gaining fat. There is no manure so strong as that of fattening animals. An animal stall-fed, kept in proper warmth, requires but little of his breathing food to keep up his heat. All the starch, gum, sugar, &c., go to form fat. Having little use for his muscles or flesh, that suffers little waste, and the nitrogen, which should go to form flesh, is voided in dung. If it is a she, no milk is given during this period, for a cow, in milk, fats not.

The dung, then, of fattening animals contains more of all the elements of food for plants, than at any other period, and is peculiarly rich in nitrogen. I trust, reader, it is not so long since you have met the word ammonia, that you have forgotten that its source and origin are due to this nitrogen. Now, the source of this nitrogen is in the food, and as, during fattening, grain is supplied for its starch, &c., to make fat, and very little waste of the body taking place, the extra nitrogen of the blood-forming materials of grain is nearly all voided in dung.

5th. The mode of employment. Your working beasts suffer great wear and tear of flesh and blood, bone and muscle, thews and sinews. Hence, their daily food supplies only this daily waste; the food is very thoroughly exhausted, and of course, the dung is weak. It derives its chief value from the excretions of those parts of the body which are voided as waste materials among the excrements. There is a distinction to be noted here: excretions are the worn-out flesh and blood elements, excrements the undigested and unused food; dung includes both excretions and excrements. Now, the chief value of the dung of working cattle depends upon the excretions.

6th. The nature of the beast. If his coat is wool, he requires more sulphur and phosphorus, the natural yolk, or sweat of his wool, more lime and ammonia than does the hairy-coated animal. Hence, sheep produce manure less rich in many of the elements of plants than cattle; but as at the same time it contains a larger portion of nitrogen, and is very finely chewed, it runs quicker into fermentation. It is a hotter manure, quick to eat, quick to work, and is soon done

7th. The kind of food. We have already spoken of this as affecting the quantity of dung. Its effects are no less marked on its quality. Now, all that requires to be said on this subject, is to remind you, reader, of the two divisions of food, the fat formers, and the flesh and blood formers. It must be evident, that the more of this last the food contains, that is, the more nitrogenous is the food, the richer the dung. Hence, grains of all sorts, peas, beans, &c., will always give a richer dung than fruits, as apples, &c. The more nitrogenous the hay, the richer the dung. Meadow cat-tail and rye grass are nearly six times stronger in ammonia than oat straw. Red clover is twice as rich in nitrogen as herd's grass; wheat, barley, and rye straw, green carrots, and potatoes contain only about one third to one fifth the ammonia of herd's grass, and turnips only about one sixth. The quantity of ammonia contained in these different grasses and straws, shows at once the effect they must have in the compost heap. The kind of litter must have no small effect upon the value of manure. And while we are upon this subject, it may not be out of place to mention, that the kind of a green crop, turned in, materially affects the value of the process. While the straws of the grain-bearing plants afford, for every ton of green crop turned in, about three quarters of a pound of ammonia, green cornstalks and herd's grass about five pounds of ammonia per ton; red clover affords about seventeen pounds of ammonia per ton.* The very great value of clover in enriching land is thus made evident. But to return to the quality of the dung, as affected by the food, it has been proved, that animals fattening on oil-cake give manure in value double that of common stock. Here abundance of nitrogen is supplied where very little is required, and consequently much is voided in dung. The point to which we have arrived is a breathing place. The remarks which have been offered upon the action of salts, have prepared the way for our entering upon the next section—the second class of manures.

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* This is the relative, not the absolute, proportion of ammonia The analysis of Boussingault gives about fifty, and one hundred and seventy as the absolute quantity.

SECTION VIII.

MANURES CONSISTING OF SALTS.

In using the term salts here, to designate a class of manures, I wish to distinguish between these and mineral manures, as they are usually termed. These manures are similar in kind to the salts, whose action in cow dung we have already considered. They are truly mineral salts, derived from the mineral kingdom, entering into and forming a part of plants, and from this source introduced into the dung of animals. Their action, whatever be their name, has been explained. But the salts composing the second class of manures now under consideration, are not of mineral origin. They are derived from the animal kingdom. The source from which they are formed is the living process of the animal body. They are animal salts. Here, then, let us divide the second class of manures into animal salts, which are truly manures, both their base and their acid acting as nourishers of plants, and into mineral salts. Here again, reader, you will find that the few facts which we have pointed out, relating to the food and nourishment of animals, will help us on our way, in tracing the source of these animal salts.

It has been already said, that the food of animals is divided into two classes: that which does, and that which does not contain nitrogen. All domestic animals eat these classes together. In a few words, let us trace their course after the animal has digested them. The one class goes to form fat, or to support the natural heat of the body, and passes off by the skin in sweat, or in moisture of the breath, and all its excess or undigested part goes off in dung. The excess of nitrogenous food, all that not required for repairing the daily waste of the body, or to increase its growth, also passes off in dung, as excrement. This is a small portion, and its effects on the strength of dung have been pointed out. But the wear and tear, as we may call it, of the flesh and blood, the parts which are daily and constantly thrown out of the body, as excretions, or old materials, enter the circulation, and pass out of the body in urine. This is the point to which I would call your attention. The undigested food, and the excrements not containing nitrogen, go off in dung. The food and the spent parts of the body, containing nitrogen, go off in urine. This last, too, is the course of most alkaline salts taken into the body. They pass off in urine. Here, then, we come to the subject quite prepared to understand it. The urine is a collection of salts, some of mineral, others of animal origin. But that which gives the urine its peculiar and characteristic properties, is a substance formed from the nitrogenous food, and termed *urea*. Now you need hardly trouble yourself to remember this new name; all I want you to understand about it is, that when urine is exposed to air it rots, and this peculiar substance is changed to ammonia. That is the point to be remembered. In considering urine, therefore, as a manure, it will not be necessary to point out further the mode of its action, than to refer that of every animal to its salts and power of forming ammonia. The quantity of the last will be in proportion to the quantity of urea. There are other salts of ammonia in urine, and also mineral salts. These affect but little the value of urine as a manure.

It is the urea, essence of urine, that substance which forms ammonia in rotting urine, which alone makes this liquid more valuable than dung. Hence, reader, if this is impressed on your mind, you will perceive that the chiefest things to be regarded in urine are, first, the circumstances which affect the quality and quantity; second, the best mode of promoting a change of urine to ammonia; third, the time required for the process; and fourth, the best mode of preserving the ammonia, when formed. You will perceive, reader, that all along, I have endeavored to point out the principles on which manures act. If you go by general principles, then for a plain practical farmer, like yourself, with only chemistry enough to understand a few of its terms, it must be quite a thankless service, to point out to you in detail all the various things contained in urine. It would confuse you more than the names, ay, and hard ones too, which are given to the varieties of pears and apples. All you want to know is this, Does urine contain, as solid dung does, water, mould, and salts?

It does. The mould is so small a part, it may be left out of view. The salts are like those in the solid dung, mineral salts, and then we have the peculiar principle urea, which, for all practical purposes, may be called ammonia. We may then, with this division, present in a table the composition of the urine of various animals at one glance:—

	Water.	Salts.	Ammonia.
Cattle urine, per 100 lbs.,	92.62	3.38	4.00
Horse " " "	94.00	5.03	0.70
Sheep " " "	96.00	1.20	2.80
Hog " " "	92.60	1.76	5.64
Human " " "	95.75	1.88	2.36

Now cast your eye carefully over this table: the figures at once tell you the value of these different liquids. The last column gives the true value. The other salts vary much in quantity, and this affects the quality. The actual amount of ammonia in human urine and cattle dung is about the same; yet in actual practice it is found the effects of urine are nearly double those of dung. Look now for the reason of this. In the first place, the principle which gives ammonia in urine runs at once by putrefaction into that state. It gives nothing else; whereas in dung the ammonia arises from a slower decay, and the principle which here affords ammonia may, and without doubt does, form other products. Hence, we have a quick action with the liquid, a slower one with the solid. A second cause of the better effects of the liquid is, that it contains, besides its ammonia, a far greater amount of salts, and these give a more permanent effect. The amount of salts in human, cow, and horse dung is about one pound in every hundred; while the urine of the same animals contains nearly six pounds in every hundred. A third cause of the greater fertilizing action is found in the peculiar character of some of these salts, which are composed of soda, potash, lime, &c., united to an acid formed from urea, in the animal body. This acid is like the acid of saltpetre; it is a nourisher of plants, as much so as is carbonic acid.

SECTION IX.

OF THE CAUSES WHICH MAKE URINE BETTER OR WORSE, MORE OR LESS, AND THE MODES OF PRESERVING IT.

THERE can be no doubt that the same causes which we have pointed out as affecting the value of dung, affect also the urine.

We have already alluded (p. 38) to the four chief circumstances to be regarded in urine. And first, of its composition. It will be affected by the age, sex, food, and difference of animal. The process of form ing urine is the same in man and animals. Now if we reason here, as we surely may, from analogy, then the effect of age and sex upon the quantity of the essence of urine or urea, will appear from the results of one hundred and twenty analyses of urine.

In 24 hours there are disch'd by men,	432	grs.	of urea.
By women, ...	293	"	"
By old men, from 76 to 80 yrs. of age,	122	"	"
By children, 8 years of age, . .	208	"	"
By children, 4 years of age, . .	70	"	"

It will be recollected, that each grain of urea is equal to a grain of carbonate of ammonia of the shops, so that a healthy man discharges daily about an ounce of this salt. If, then, other animals are affected by age and sex, as is the human species, then we may say that bulls and oxen give a better urine than cows, steers better than calves, and a venerable old cow gives as much of the essence of urine as two calves.

Food affects the quantity of water, and that acting merely to dilute the urine, renders it weaker in salts for a given amount, though perhaps not the daily amount of salts. Supposing the animal well fed, so as to keep up the wear and tear of his blood and flesh, then as the urine derives its chief value from the worn-out materials of the body, the actual amount of urea daily discharged may be the same, though the amount of the urine may vary considerably. We may increase the amount of salts and acids by particular food, but this can never be continued long enough to change materially the character of urine as a manure.

Difference of animal has also a great effect on the quality of urine. The more active, the greater the wear and tear of the flesh, the better the urine in working animals. Where the animal is stall-fed, there, no doubt, the urine is still richer, and the urine of fattening animals is still more valuable. Hence, of all animals, commend me to swine, as manufacturers of ammonia. Cast your eye on the table (page 38) of the amount of urea or ammonia furnished by various animals. No one exceeds the hog. He seems specially formed by nature for this office. He eats everything. His habits require very little of that class of food which forms flesh and blood. He is a fat former, a magazine of lard, a real oil butt, and demands, therefore, the food essential to form fat and keep up his heat. He returns, of course, having little lean meat to form, (nobody would praise him for that,) having little flesh to form to increase his size, he returns quickly the waste his body suffers as urea, which becomes ammonia. But it is only the still, and quiet, and penned animal, which gives this valuable product. If we would cause him simply to produce the greatest amount of his manufactory, without taking into account his labor in shovelling over the compost heap, perhaps no better rule can be given than the Shaker practice of feeding with lettuce leaves. Having little brains to replenish or build up, and not quick in his nerves, (for be it known to you, reader, the opium of lettuce leaves is supposed to contribute mainly to the formation of brain and nerves,) the opium-eating hog will return a vast amount of the nitrogen of his lettuce, in the shape of ammonia. If now you add to the facts, common to the nourishment of swine, the action of ammonia on mould, as it has been explained, you will see that he who neglects to fill his yards with mould, and swine to convert it, overlooks one of the cheapest, most effectual, and certain modes of forming manure, which practice and theory unite in pronouncing the surest element of the farmer's success. Not only is the quality of urine affected by age, sex, food, difference of animal, but the season also exerts an influence upon this liquid. The urine of cattle often contains ammonia ready formed in summer, but never in winter. In cold weather, the amount of ammonia, or rather the principle affording it, is less; often it is not one half in winter what it is in summer. This certainly is a misfortune to the farmer, who generally keeps his cattle up only in winter; but then it is an argument also for the practice of summer soiling.

Secondly, with respect to the circumstances necessary to change urea to ammonia; or, in short words, to fully ripen urine, or to make it a fit manure. These also depend upon the season, in part. It is to be remembered, reader, that this rotting of urine is only fermentation. It takes place, because there is a principle in urine which brings on fermentation, just as it does in new cider. Now if it is by fermentation that urine rots, it will take place, as all fermentation does, best at a moderate temperature. The cold of winter will prevent it. Hence your winter manure must be allowed time, as the heat of spring comes on, to ferment, that the urine may be changed to ammonia; and every means must be taken to prevent the heat rising beyond, in the manure heap, or falling below a moderate temperate warmth. These are the circumstances which chiefly promote the change from urea to ammonia.

Thirdly, in regard to the time in which this change will take place, it will require at least one month; and six weeks are better. If urine be allowed to rot for a month, it fully doubles its quantity of ammonia. In fact, it would have contained more than double the ammonia of fresh urine, had not a portion escaped.

This brings us to our fourth point, the best mode of preventing the flying off of the ammonia when this change has taken place. Much has been said about tanks, and vats, and urine pits, and many plans devised for preventing the escape of volatile ammonia. But when once the action of ammonia upon mould is understood, as we have already pointed it out, I am persuaded, reader, that these tanks, and vats, and urine carts will appear to you not only expensive and cumbersome, but useless. Your first point is, to save your ammonia; your second is never to use urine in its caustic or burning state If you do, you will as assuredly burn your crop, as the puddle formed by a cow burns the grass upon which she empties her watering pot. Here the urine, forming caustic ammonia, acts as would caustic potash, or a lump of stone lime, left to slack upon the grass. You want to change this burning or caustic ammonia into mild ammonia, or to combine it with some substance which has not only that effect, but also keeps it from flying away. Unless you understand, then, the principles of these actions, and apply them too, your labor is all vanity, when you attempt to save your own or your cattle's urine.

These principles are in number, two. First, the principle which changes caustic to mild ammonia is carbonic acid, derived from air, or decomposing mould. Second, the principles which render ammonia less volatile, or wholly fixed, are certain acids, formed in mould, as sour mould, or certain salts which give up their acid to the ammonia. Plaster of Paris does this, by changing its lime for ammonia. Now let us go into the reason of this a little, and see if we can understand it. Very slowly, and supposing moisture present, the oil of vitriol of the plaster quits its lime, and unites to the ammonia, and so changes a volatile into a fixed salt. Now this is a change which has been of late much insisted on, and the practice recommended, of strewing the stable and barn cellars, and even the privies, with plaster, to save the ammonia, which escapes in these places. But it is doubtful whether the saving is as great as is usually supposed, for the ammonia arising from the urine is caustic, it flies off as caustic ammonia, that has no effect upon plaster. To produce this mutual effect of ammonia and plaster, the caustic ammonia must previously have been made mild. However, this plan is applicable only on a small scale. Copperas, alum, common salt, potashes, and wood ashes, all act to fix the volatile ammonia, and have all been recommended for this purpose. But it is easily seen, that, in employing some of these substances, is to buy ammonia almost at apothecary's price. These practices will be followed, therefore, only by those who place the crop and its value upon ammonia. This is a limited and narrow view. The true and farmer-like, as well as the most scientific and natural mode of preserving the ammonia of urine, is to fill your yards and barn cellars with ptenty of mould; by which I mean truly decayed and decaying vegetable matter, as well as loam. There is no mode more effectual, no mode more economical. Consider now for a moment, how mould formed and forming, and ammonia act. Have I not said, again and again, that ammonia hastens decay? that it makes mould more easily dissolved? and cooks the food of plants? That action having occurred during its progress, acids were formed. The ammonia unites with them, loses its burning properties, and becomes fixed. The acids having been satisfied, the ammonia is actually imbibed and retained by mould.

It does not drink it in like a sponge, but the mould forms a peculiar chemical compound with ammonia. This peculiar compound, while it does not render the mould an easily-dissolved matter, yet holds ammonia by so feeble a force, that it easily yields to the power of growing plants. It gives up the stored ammonia at the place where, and the time when, it is most wanted. If you remember these actions of mould and ammonia, it will be as plain as day, that what we have said of the inexpediency and expense of vats, and tanks, and urine carts, must not only be true, but is confirmed by the experience of a host of hard-working, thinking, practical men. In connection with urine, the dung of birds, for instance, domestic fowls of all kinds, and pigeons, may be here mentioned. These animals discharge their solids, and what we may term their liquids, together. Their urea comes out combined with, or forming part of their dung. Now reflecting a moment on the nature of their food, strongly nitrogenous, being seeds, grains, &c., or animals, bugs, grasshoppers, &c., we can understand why their droppings are peculiarly rich in ammonia and salts. The strongest of all manures is found in the droppings of the poultry yard.

But since these form but a small portion of the farmer's stock, and are never regarded as a principal source of manure, their further consideration may be omitted. It may perhaps be here added, that as from their nature bird droppings run quickly into fermentation, with warmth and moisture, so they act quickly, and are quickly done. They are more allied to sheep dung than to other manures. Their mould not being great, droppings of poultry require to be mixed with decayed vegetable matter, or loam. To this class belongs the manure brought from the Pacific Ocean, under the name of *guano*, a Spanish word for excrement. New-England farmers can find cheaper sources of salts, to which the main value of guano is owing, and therefore, reader, we shall detain you no longer on this point.

SECTION X.

MINERAL SALTS, OR MANURES.

HAVING thus considered the salts derived from the animal, let us now proceed to those derived from the mineral kingdom. Among these, we shall find some whose action is similar to that of the animal salts; that is, they are true nourishers of plants.

They afford, by the action of the growing plant, the same elements as the animal salts. Of this nature is saltpetre. Now, reader, I want you to understand by saltpetre, not only that well-known substance, but also that which has lately been much used in farming, South American saltpetre. This differs from common saltpetre, by changing its potash for soda. One step more. I want you to understand by saltpetre, not one salt, but, in farming, a class of salts; that is, a number, having the same acid, which may be combined with several different bases which all act one way. Saltpetre being a salt, of course must be composed of an acid and a base. The acid is always aqua-fortis, or nitric acid. The base may be potash, or soda, or lime, or ammonia. These all may be called saltpetre. In forming saltpetre, it is generally that variety which contains lime and aqua-fortis which is procured. So far as we understand the action of salts, and this has been fully explained, the action of the varieties of saltpetre is the same; and were it not for the peculiar nature of the aqua-fortis, or acid of saltpetre, the explanation of the action of this salt might be referred to the general laws above set forth. But the acid of saltpetre is composed of volatile ingredients. It is nothing more nor less than a compound of the common air we breathe. Surprising as it may seem, reader, yet it is not the less true, the common air is a mixture of oxygen and nitrogen. What a bland and harmless, yea, what a healthful blessing is air, not only to us, but to plants! It is a mere mixture, not a chemical compound, a mere mixture. In every hundred parts, eighty of nitrogen, twenty of oxygen. Yet if you compel, as natural operations are continually compelling the air to unite chemically, so that fourteen parts of nitrogen shall unite to forty parts of oxygen you will form aqua-fortis. Now, I do not mean to trouble your head further with the chemistry of saltpetre, than merely to say, that having thus shown you the composition and origin of the acid of all kinds of saltpetre, you will readily see, that a substance which affords such an abundance of nitrogen cannot but be beneficial to plants. This nitrogen may, and probably does, form some portion of ammonia in the soil. It may enter as nitrogen into the plants, dissolved in water, as a very weak aqua-fortis

We have said so much upon the action of ammonia and nitrogen, that you will perceive how important a part nitre is likely to play in manure. Not only does the nitrogen act here, but the oxygen, the other component of the acid, also acts. It acts upon the mould as air itself would. Besides, the mould of soil and manure imbibes and condenses this oxygen in its pores, and consequently heats a little; so that saltpetre, whether added as such to soil, or formed in manure, as it is always, helps to warm a little the soil, like fermenting manure. So far as these effects are desirable they may be expected from the use of saltpetre. But this, reader, if you buy your saltpetre, is procuring a small effect at a great price. The action of the alkali of saltpetre is not different from alkali in other shapes, and therefore if you have money to lay out for salts, let me advise you, reader, to spend it rather for ashes than for saltpetre.

SECTION XI.

OF ARTIFICIAL NITRE BEDS.

But there is a fashion in manures as well as in other things, and saltpetre is now so fashionable that you may be inclined to use it. Be it so. I will show you, reader, how to make it for yourself, and at the same time form a large pile of capital mould. But as you have begun to inquire a little into the reason of things, let us go a little into the reasons why the earth under all barns where cattle are kept, why the plaster of old houses and cellar walls, always afford saltpetre. You well know that this is the case, and why? We have already told you, that the acid of saltpetre, that is, the aqua-fortis, is formed of the air we breathe. Now alkalies and porous bodies compel the constituents of air, under certain circumstances, to unite and form aqua-fortis, and this immediately unites to the alkali, and forms saltpetre. The best alkali to compel this union, is ammonia. Hence, where plenty of animal matter is fermenting, or rotting, or where plenty of urine is, there, porous bodies being present, saltpetre will be formed. Now this is enough for you, to understand the principle upon which I propose to you to form an artificial nitre bed for your own use. It has been found that the manure of twenty-five cows, asses, and mules, in layers of about four inches thick, with layers of the same thickness of chalky soil, first one and then the other, and now and then damped with the urine of the stable, produces from 1,000 to 1,200 lbs. of saltpetre in four years.

The heap is formed under cover, and occasionally shovelled over. At the end of two years, it is a mass of rich mould. It is left two years longer, with an occasional turning over, but it is not wet with urine for the last few months. The dung the farmer has always; he wants the porous chalky body. This may be furnished by spent ashes, mixed up with its bulk of loam. Hence the following rule may be given:—One cord of clear cow dung, one cord of spent ashes, one cord of loam or swamp muck. Mix the ashes and the swamp muck well, and having hard rammed the barn cellar floor, or that under a shed, lay a bed upon it four inches thick, of these mixed materials; then a layer of dung, three or four inches thick, and so on, till the pile is two or three feet high, topping off with loam. Wet it occasionally with urine, keeping it always about as moist as garden mould. Shovel over once a fortnight for two years. The pile now contains about fifty pounds of several varieties of saltpetre, and mixed throughout with nearly three cords of excellent manure. It may, therefore, be now used, according to the farmer's judgment. By thoughtful management, he may, after the first two years, annually collect as many fifty pounds as he employs cords of cow dung. But, however prepared, nitre affords, by its elements, nourishment to plants. All its parts act. Its alkali acts, and its acid acts.

SECTION XII.

ASHES.

It is easy to see that salts, whatever be their name or nature, which are likely to be of any service to the farmer, are those only which either enter into and form part of the plants, or which, by the action of their acid or base, act on the earthy parts of soil, or upon the mould. Salts either poison or nourish plants. The first, like the medicines we take, are good in small doses; the second can hardly injure, even by their excess. If we recur to the principle, with which we set out early in this essay, that the ashes of plants contain all their salts, then, rightly to know what salts are likely to produce good effects as manure, we should first study the composition of ashes. We have, in ashes, a great variety of substances. They come from the soil. They form a part of plants. The dead plant returns them again to their mother earth, or we, losing the volatile parts of a plant, its mould and ammonia, by burning, collect its salts as ashes. Let us see what these salts are made of. In the first place, you know, all salts are composed of an acid and a base.

The bases are,	The acids are,
Potash and soda,	Carbonic, or carbon united to oxygen,
Lime,	Phosphoric, or phosphorus, do.

Magnesia,	Sulphuric, or sulphur united to oxygen.
Clay,	Muriatic, essentially composed of chlorine.
Iron,	
Manganese,	
Silex, or the earth of flints.	

Now if we throw out the carbonic acid, which has been formed in burning, we have left in ashes three acids, which are united with he bases, and may form the following salts in plants, namely :—Glauber's salt, Epsom salt, common table salt, bonedust, a salt of lime, and what we may term a bonedust salt of iron, or phosphate of iron, plaster of Paris, or gypsum, copperas, alum, and some other salts, which need not be enumerated. Our list comprises the principal, and those most likely to be used in farming. Well, now, the lesson to be drawn from this composition of ashes is this, that there is scarcely any salt occurring in commerce, which may not be used in agriculture, instead of those found in ashes. In fact, almost all salts which occur in a large way, as refuse materials from manufactures or other sources, have been used, and all with greater or less success, as manures. And if you cast your eye over the acids and bases of common ashes, this seems quite reasonable. It is not expected that a plain farmer, possessing little or no chemical knowledge, should be able to tell beforehand what the effect of a salt would be, applied to his land ; but if he understands what the composition of ashes is, he may be sure that in any quantity in which the salt is likely to occur, it cannot be injurious, provided it is mixed up with plenty of mould, and a little ashes, or alkali, which will kill or neutralize any excess of the poisonous acid.

In ashes, we have one part which may be leached out, and a part which remains after leaching, called spent ashes. Let us see then, in leaching, what parts we take away. First, we take away all the acids except the phosphoric. Secondly, we take away nearly all the potash and soda. What is left? All the other bases and phosphoric acid. It is evident, therefore, that the strength of ashes can never be wholly leached out, if that depends upon the salts. In spent ashes, we have nearly all the bonedust left; and, besides this, a portion of what is usually considered the real strength, that is, the potash. This is chemically united to certain of the other constituents of ashes. You cannot leach it out, leach you ever so long. Upset your leach tubs, shovel over your spent ashes, mix it up with fermenting manure, where a plenty of fixed air is given off. Here is the secret of the value of spent ashes, so far as the potash or ley strength is concerned. This exposure to air, to carbonic acid, lets loose the potash, which was chemically combined with the other matters. Water would never have done this. Mark now a practical lesson, taught here by chemistry, and confirmed by experience. Leached ashes must never be used on wet soil, if we want its alkali to act. The close wet soil, perhaps even half covered at times with water, excludes the air. The carbonic acid of air, that which alone extracts the alkali from spent ashes, cannot here act. There is this other lesson to be learned from these facts, that it is chiefly the alkaline action which is wanted from spent ashes. Hence no one who thus understands the source, and the true value of ashes, will allow the alkaline portion to be first leached out, unless he can find a more economical use for it than its application as a fertilizer. Perhaps no fact speaks louder, that the great action of spent ashes is that of its potash, than this, that where we prevent that from being extracted, the spent ashes are of little value. If, then, spent ashes derive their great value from the potash, much more will unleached ashes derive their value from their potash.

Now, reader the point to which I have led you, in these remarks, is this, that the more alkaline any salt is, the better is it for manure. Hence, as a general rule about the use of salts, it may be laid down that the alkaline salts, that is, potash, pearlash, common ashes, barilla ashes, white, or soda ash, are the best. And as these, in all their various shapes, are the cheapest and most common articles, so you need not run after a long list of other salts. Next in value to the real alkalies, are spent ashes, used in a light, porous, open, sandy soil, if you would derive the greatest benefit from them. Next to these come peat ashes. You well know these are of no value to the soapmaker. But not so to you. They show only traces of alkaline power. But treat them as you did spent ashes. Their power, independent of their bonedust, which is by no means small, and their plaster, which is still greater, and their lime, which is perhaps the greatest, lies in the alkali, which is locked up, as it is in spent ashes. Treat them, therefore, as you did spent ashes, and then peat ashes will and do afford alkali. So too coal ashes, even your hard anthracite ashes, yield all the substances which spent ashes do. It is easily seen, therefore, when, how, and where spent ashes, peat ashes, coal ashes, are most likely to do good. Perhaps we may not have a better place to state the fact, that a cord of soap-boilers' spent ashes contains about fifty pounds of potash. When we add to this, one hundred and seventeen pounds of bonedust, and about a ton and a half of chalk, or carbonate of lime, which acts chiefly on the soil, and so comes not now under consideration, it is seen that there is no cheaper source of alkali and salts, to one within reasonable carting distance of a soap-boiler, than spent ashes. They are marl, bonedust, plaster, and alkali combined.

SECTION XIII.

MANURES COMPOSED CHIEFLY OF MOULD.

THESE are of vegetable or animal origin. And first, of animal mould. Here we shall find that we come, perhaps, better prepared to understand this part of our subject, than either of the preceding classes. We have explained the principles which enable us to understand why it is that animal and vegetable substances produce, by decay, identical matters. The only difference consists in the quantity of these matters.

Let me here, reader, call to your remembrance the facts we stated respecting the two classes of food, and the two classes of substances formed from that food by animals. A certain portion of that food contains none of that principle which forms ammonia. This portion of food makes fat. Another portion of food contains the substance which forms ammonia. This part of the food forms flesh and blood, and the other parts of the body, skin, hair, feathers, bristles, wool, horns, hoofs, nails and claws, thews and sinews. Now, when a body dies and decays, the mould which it forms will be rich manure, or poor manure, just in proportion as it contains more or less of the substances formed out of that portion of food which furnishes flesh and blood. The fat, therefore, in animal mould, plays a very inferior part to that acted by the flesh and blood. In a word, as I wish to dismiss the fatty matters from our present consideration, I may do this, reader, by stating to you all that you need know, that in decay, fat forms chiefly carbonic acid. If, therefore, you call to mind what we have said about the action of that, you will see how fat acts in manure. But the flesh and blood, and the substances formed from it, give precisely the same things as vegetables do when they decay; that is, water, mould, and salts.

The great difference between the decay of animal and vegetable matters is this, that as the animal bodies are far richer in the substance which forms ammonia, so they afford a richer source of manure. The animal body contains that element in quantity enough, not only to fill the pores of its own mould, but also enough to impregnate a large quantity of mould from other sources. The vegetable body, on the contrary, contains scarcely enough ammonia to fill its own mould. Vegetables differ in the quantities of the elements of food which can furnish flesh and bood; and hence those vegetables are best for manure which furnish most ammonia. We have already remarked on the difference, in this respect, between straws, grasses, and clover. But without going further into this comparison, which can have no other practical bearing than to show you the immense difference in value, in animal and vegetable bodies, in forming manure, we may here resolve the subject into one great principle. The substance which forms flesh and blood, whether derived from plants or animals, alone forms ammonia during their decay, and the mould thence arising is rich or poor manure, just in proportion as it contains the substance fit to form flesh and blood. Starting from this principle, we find that animal substances, as flesh, fish, fowl, the body generally, including its various forms of covering, hair, wool, feathers, nails, hoofs, horns, claws, &c., afford, in the process of decay, about ten times more ammonia than the straws and grasses usually entering into the compost heap. The animal bodies give more volatile alkali than their mould can contain.

It is given off in such quantity that decay is rapidly hastened. All the signs of putrefaction, therefore, rapidly take place. The quantity of mould being small, nothing holds the volatile parts; they escape and are lost. Now common sense and practical foresight have stepped in here, from time immemorial, and taught mankind the necessity and the utility of preventing the waste of the volatile and most valuable parts of the decaying animal substances, by covering them in with earth, soil, &c. These imbibe the escaping virtue or strength, and become rich and fertilizing. It remains to state, that every pound of animal carcass can impregnate ten pounds of vegetable mould; or, taking our arable soils as they usually occur, one pound of flesh, fish, blood, wool, horn, &c., can fertilize three hundred pounds of common loam. You will see, therefore, reader, how little you have now to learn of the necessity of saving everything in the shape of animal matters, and converting them to manure, by turning them into your compost heap. It is to be remarked, that the dry forms of animal substances undergo the process of decay when left to their own action very slowly. Wool, hair, flocks, horn shavings, &c., or even leather chips and curriers' shavings, bear long exposure, and seem quite indestructible. They yet are rich in all the true virtue of manure. They want something to bring this out, to set them a-working, to bring on fermentation. Well, on this head we may lay down two rules. The first is, that if buried among a heap of fermenting matter, that communicates a similar change to these dry, animal substances. This is slow work.

The second rule is, that if these dry matters are buried in the soil among the roots of growing plants, then these act more powerfully than fermentation, and the dry substances are converted to manure with a speed which may be called quick, compared to the fermenting process. The practical lesson to be drawn from these differences of action between the fleshy and horny parts of animals is, that when you want a quick and short action of manure, to use the fleshy and fluid parts. Where you want a more slow and permanent action, to commence and long last after the first is over, to use the dryer and harder parts.

If now we turn to the other division of mould, that from vegetables, we find it lacking in the very thing which was superabundant in animal mould. That thing is volatile alkali. The great mass of vegetable mould is always impregnated, but always slightly charged, with volatile alkali. There is not enough of the flesh and blood forming element in vegetables to hasten the decay of vegetable matter, or to convert them, after decay, into rich manure. Now here again not science, but practical common sense steps in, and did step in long ago, and as she taught mankind the necessity of adding soil or mould to the decaying animal matter, so here, to enrich vegetable mould, she teaches that animal matter, or that which is its representative, *alkaline salts*, must be added to vegetable mould, to make it active. It is not the mould alone which plants want. We have seen all along how nature provides a certain amount of salts in her virgin mould; we, by cropping, exhaust these faster than the mould. We have tons of that, yet our fields are barren. They want, as has been explained, salts.

And now, reader, having been brought by this course of reasoning to what the mould wants, consider what tons and tons of useless mould you have in your swamp muck and peat bogs, your hassocks, and your turfy meadows. All these, foot upon foot in depth as they lie, are truly vegetable mould, in a greater or less degree of decay. If you dig this up, and expose it to the air, that itself sets it to work, decay is hastened, volatile matters escape, yea, ammonia, the master spirit among manures, is secretly forming and at work, warming and sweetening the cold and sour muck. Without further preparation, practice confirms what theory teaches, that this process alone furnishes from these beds of vegetable mould a very good manure. It is already highly charged with all the salts which a plant wants. But experience, doubtless led by the light of the good results of mixing mould with animal matter, to preserve its strength, has also reversed the practice, and taught the utility of adding to vegetable mould quickening salts; that is, either the volatile alkali, by composting the mould with stable manure, or alkali in the shape of ashes, or potash, or soda ash, or lime, or a mixture of these. In fact, whatever substance can by putrefaction give off volatile alkali, will and must and does convert vegetable mould, of itself dead and inactive, into a quick and fertilizing manure.

If then, reader, you pause here a moment upon this fact, and then cast your view backward over the principles we have endeavored to impress on your memory, you will perceive that there is not, among all the classes and kinds of manure which we have shown you, one which may not be added, or, as is the phrase, composted with peat, meadow mud, swamp muck, pond mud, or by whatever other name these great storehouses of vegetable matter are called. These are the true sources of abundant manure, to all whose stock of cattle, &c., is too small to give manure enough for the farmer's use. It is the farmer's business to make a choice, if he has any but Hobson's, of what substance, or mixture of substances, he will use. We have shown him how small a portion of animal matter, one to ten of pure mould, will impregnate that substance. Taking then a cord of this swamp muck, we shall find it contains, in round numbers, about one thousand pounds of real dry vegetable mould. So that the carcass of an animal weighing one hundred pounds, evenly and well mixed up with a cord of fresh-dug muck, will make a cord of manure, containing all the elements, and their amount too, of a cord of dung.

But it is not from the carcasses of animals that the farmer expects to derive the quickening salts for his muck. This can be the source of that power only to the butchers, (what fat lands they all have!) or to the dwellers near the sea, where fish is plenty. A barrel of alewives, it is said, fertilizes a wagon load of loam. The carcass of a horse converts and fertilizes five or six cords of swamp muck. A cord of clear stable dung changes two cords of this same muck into a manure as rich and durable as stable manure itself.

These are all the results, reader, of actual practice. The explanation of the principle has only come in since the practice, and showed the how and the why of this action. But the merit of explaining this action would be, is nothing, if it had not conducted one step further.

The explanation of the principle of action of animal matters, animal manures of all kinds, whether solid or liquid, on muck or peat, has led chemistry to propose, where these cheap and common forms of quickening power are not to be had, to mix ashes, or potash, or soda ash with swamp muck. Now, reader, this is not an idle, visionary, book-farming scheme. It is perhaps one of the few successful, direct applications of chemistry to farming, which speaks out in defence of such book-farming, in tones and terms which bespeak your favorable consideration for the attempt which science is making to lend you, reader, a helping hand. This proposal, the offspring of science, has been carried out successfully by practical men in our own country, and has made its way abroad. Though this is not the place to give you the details of their results, you may rely upon the fact, that alkali and swamp muck do form a manure, cord for cord, in all soils, equal to stable dung.

Well now, after your patience in going over these pages, I hope you will find your reward in this statement. To be sure, it might have been said at once, and so have done with it, but I hoped, reader, and I am sure I have not been disappointed, that you liked to dive a little into the reason of things, and felt that you had farmed too long by the rule of thumb, to be satisfied that it was the road either to improvement or profit. And so among your first attempts at improving your worn-out lands, always supposing that you have a barn cellar, hogs, and swamp muck, so aptly called by one of your own self-made practical men, the "farmer's locomotive," I presume you may like to know the proportions in which you may mix swamp muck and alkali. You can hardly go wrong here by using too much; the great danger is, you will use too little alkali. But calculating on the proportion of mould in fresh-dug swamp muck, or peat, it may be stated as a rule, grounded on the quantity of quickening power in a cord of stable manure, that every cord of swamp muck requires eight bushels of common ashes, or thirty pounds of common potash, or twenty pounds of white or soda ash, to convert it into manure equal, cord for cord, to that from your stable. Dig up your peat in the fall, let it lie over winter to fall to powder, calculate your quantity when fresh dug, and allow nothing for shrinking in the spring; when your alkali is to be well mixed in with the mould, and, after shovelling over for a few weeks, use it as you would stable manure.

These quantities of ashes and alkali are the lowest which may be advised. Three or four times this amount may be used with advantage, but both the quantity of alkali and the number of loads per acre must and will be determined by each for himself. It is a question of ways and means, rather than of practice. But supposing the smallest quantity of ashes or of alkali to be used which we have advised, then at least five cords of the compost should be used per acre. This may be applied to any soil, light or heavy. But there is another form of this same swamp muck and alkali, which should be used only on light, loamy, sandy soils, to produce its greatest benefit, though even on heavy soils, if not very wet, it may be used with great advantage. This is a compost of one cord of spent ashes to three cords of swamp muck. This is decidedly the best mixture which has yet been tried. We have in this all that mixture of various salt and mould which plants want, and both by the action of the mould and by that of the air, the alkali of the spent ashes, which no leaching would extract, is soon let loose, and produces all the effects of so much clear potash or soda.

I have thus, reader, given you a few of the ways by which you may convert your peat bogs and swamps into manure, when you have neither cattle nor hogs. I have not thought it worth while to go into this subject further, and give you directions for lime and salt, or other matters which might be used. I have given you the most common, and those well known and at hand. All you want, then, to apply these principles of forming composts, is to give them that little attention which will enable you to understand them. And the rest must be left to your practical common sense, without some share of which, farming, like everything else, would be vanity and vexation of spirit.

THE AMERICAN KITCHEN GARDENER;

CONTAINING

PRACTICAL DIRECTIONS FOR THE CULTURE OF

VEGETABLES.

ALSO,

GARDEN FRUITS, STRAWBERRY, RASPBERRY, GOOSEBERRY
CURRANTS, MELONS, &c., &c.

Deborah Green

BY T. G. FESSENDEN.

REVISED FROM THE 35th EDITION, AND ADAPTED TO THE USE OF
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BY A PRACTICAL GARDENER.

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INTRODUCTION.

THE importance and utility of HORTICULTURE, or the art of cultivating those products of the soil which are used in domestic economy, require no elaborate exposition. The greatest blessings which a kind Providence can bestow on man, in his sublunary state of existence, are, health of body and peace of mind; and the pursuits of gardening eminently conduce to these. Gardening was the primitive employment of the *first man;* and the *first of men*, among his descendants, have ever been attached to that occupation. Indeed, we can hardly form an idea of human felicity, in which a garden is not one of its most prominent characteristics.

Gardening is not only an innocent and healthy, but a profitable occupation. It is not alone by the money which is *made*, but also by the money which is *saved*, that the profits of a pursuit should be estimated. Where a good garden constitutes part of a rural establishment, and the culinary uses of its productions are well understood, the field or the market furnishes a proportionably small part of the provisions necessary for family consumption. "I consider," said Dr. Deane, "the kitchen garden of very considerable importance, as pot-herbs, salads, and roots of various kinds, are useful in house-keeping. Having a plenty of them at hand, a family will not be so likely to run into the error, which is too common in this country, of eating flesh in too great a proportion for health. Farmers, as well as others, should have kitchen gardens; and they need not grudge the labor of tending them, which may be done at odd intervals of time, which would otherwise chance to be consumed in needless loitering."

Cowley says of gardening, "It is one of the best-natured delights of all others, for a man to look about him, and see nothing but the effects and improvements of his own art and diligence; to be always gathering some fruits of it, and at the same time to behold others ripening, and others budding; to see his soil covered with the beauteous creatures of his own industry; and to see, like God, that all his works are good."

We shall here state, concisely, some of the principal prerequisites for successful horticulture, directing our observations, chiefly, to what relates to the kitchen garden. Gardens are usually classed under the following heads:—the *kitchen garden;* the *fruit garden;* and the *flower garden.* The flower garden, being designed principally for ornament, should be placed in the most conspicuous part, that is, in front, or next to the back part of the house; the kitchen garden and fruit garden may follow in succession. With respect to the natural situation of a garden, Nicol and Forsyth agree in preferring a gentle declivity towards the south, a little inclining to the east, to receive the benefit of the morning sun. A kitchen garden should not be situated at any great distance from the house, lest, being too much out of sight, it should be out of mind, and the necessary culture of it too much neglected. It should be placed adjoining to a stable, whence the dung may be easily conveyed into the inclosure. It should be sheltered, as much as can be, from the north and east, to prevent the blighting winds from affecting the trees. The best soil for a garden is a sandy loam, two or three feet deep, according to Forsyth; but if deeper, the better. The earth should not be of a binding nature in summer, nor retentive of rain in winter, but of such a texture that it can be worked at any season, when not frozen, without difficulty.

A garden should have a close fence, that the winds may not drive seeds of weeds into it. The fence should be at least seven feet high, and picketed to prevent the entrance of thieves

The height and closeness of the fence will increase the vegetation by increasing the warmth of the air in the garden, excepting, perhaps, the parts which are shaded by the fences. The rage of high winds will be so opposed as to prevent the tearing and distorting of tender plants, and fowls may be more easily kept out. The height of walls for training fruit trees, generally approved, is from ten to twelve feet; but it is more commonly determined by the size and form of the garden, and the inclination of its surface. "Many low walls, or stout ranges of paling," Abercrombie observes, "will produce a greater total effect, in accelerating fruit, than the same expenditure in high walls." "Fruit walls, five or six feet high, Hitt remarks, "will do very well for peaches, cherries, vines, and figs; but he would not advise the planting of apricots, plums, or pears, on such walls, they requiring more room, and to stand longer before they bear. Garden walls have been colored white or black, and the latter color is justly preferred as absorbing and refracting more heat than any other, and thereby accelerating the maturity, and improving the quality of fruits."

A copious supply of water is very essential to a good kitchen garden. Loudon remarks, that "Many kitchen crops are lost, or produced of very inferior quality, for want of watering. Lettuces and cabbages are often hard and stringy; turnips and radishes do not swell; onions decay; cauliflowers die off; and, in general, in dry seasons, all the *cruciferece* become stinted or covered with insects, even in rich, deep soils. Copious waterings in the evenings, during the dry seasons, would produce that fullness and succulency which we find in the vegetables produced in the Low Countries, and in the Marsh Gardens at Paris, and in England at the beginning and latter end of the season.

Vegetables that are newly transplanted, as they have their roots more or less diminished, or otherwise injured, often need watering, until they have taken new root. But this should be done with caution. If a dry season follow the transplanting, let them be watered, if they appear to droop, only at evenings, and in cloudy weather, and with water which has been exposed, one day at least, to the shining of the sun; not with water directly from a well, or a cold spring, as it will give a chill to the plants. Only a small quantity should be applied at once, that it may have an effect similar to that of a refreshing rain; for water, applied too plentifully, sometimes washes away the finest of the mould from the roots, or makes little cavities about them. which admit too much air.

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AMERICAN KITCHEN GARDENER.

ARTICHOKE.

Cynara Scolymus.—Artichaut, Fr.—*Artischoke*, Ger.

There are, according to Loudon, three varieties cultivated—Conical, French, or oval artichoke, with green head. The head is oval, the scales open, and not turned in at the top, as in the globe sort.—Globe, or largest, with dusky, purplish head. The scales are turned in at top, and the receptacle more succulent than the other.—The dwarfish globe, a prolific variety, and valuable as occupying little room with its head. The globe kind is the only one usually cultivated in this country.

In making new plantations, select deep, rich, light loam, not liable to retain much wet in winter, nor to be very dry in summer. Let it have a gentle slope, sufficient to carry off any moisture that might lodge in the trenches between the rows, for that is more injurious to the roots in winter than the severest frost. Lay on a good quantity of rotten dung, and trench the ground eighteen inches deep, incorporating the manure well therewith, and thoroughly pulverizing the ground in digging; then proceed to slip off the young shoots from the mother stools, with all the roots and fibers they may have thrown out, and close the earth about the remaining shoots. These being provided, pull off any loose hanging leaves, and trim the fibers; then plant them with a dibble about four or five inches deep, in rows five feet asunder, and two feet apart in the row, leaving part of their green tops above ground, and the hearts of the plants free from any earth over them; be careful also to give each plant a little water to settle the earth about its roots.

Or, if you have seedling year old plants in a seed bed, you may take them up, and after shortening the tap roots a little, and dressing their leaves, plant them as above.

Subsequent culture.—"All spring and summer keep them clear from weeds, by occasionally hoeing between the plants; this, with regular waterings in the dry weather of summer, is all the culture which they require, till the season of production has terminated. They will produce some tolerable heads the same year in August, and thence till November; next year they will head sooner in full perfection. By having fresh stools planted every year or two, the old and new plantations together furnish a production of heads from June or July till November. Besides the main head, several smaller lateral heads generally spring from the sides of the stem in succession; but, in order to encourage the principal head to attain the full size, most of the side suckers should be detached in young growths, when their heads are the size of a large egg, which in that state are also prepared for some tables. As to the continuing main heads, permit them to have full growth till the scales begin to diverge considerably, but gather them before the flowers appear, cutting to each head a part of the stalk. When the entire crop on a stem is taken, cut off the stem close to the ground, to give the plant more strength for new shoots."—*Abercrombie.* "To encourage the production of large main heads, some detach all the lateral heads in a young state. These are commonly in a fit state for eating raw, having attained about one third of their proper size; and they are for this purpose frequently sold in Covent Garden market, chiefly to foreigners. Another thing practiced, with the same view, is the shortening the ends of the large leaves."—*Neill, in Ed. Encyc.*

Winter dressing.—Abercrombie says, " First cut down all the large leaves, but without hurting the small central ones, or the new shoots. Then dig the ground between and along each row; raising it gradually from both sides, ridgeways, over the roots, and close about the plants. In rigorous frosty weather, cover also in the litter, and close about each plant." Armstrong remarks, that "various means have been employed for preserving the outstanding plants during the winter. That which is most commonly used is, after stripping off the dead or decaying leaves, and trimming down the sound ones to three or four inches, to open trenches around the plant, and to draw about it the earth furnished by these. This is again covered with long dung or stable litter. so as entirely to exclude rain, and snow, and frost. But, in making these provisions against cold and wet weather, we must not forget that it is possible to be careful overmuch; for if the mounds of earth and litter be large and close, we expose our plants to suffocation from want of air; to exhaustion from a continued vegetation, and to scorching from the fermentation of the covering matter, which, if the weather be wet, and but occasionally warm, seldom fails to occur.

" To obviate these difficulties, it has been proposed that the mounds be *gradually* formed; that the first covering be merely a wrapping of long dung, and that the additions made to it be conformed to the weather, leaving openings in all cases, on its southern side, for the purposes of ventilation, and in no case to permit the covering to exceed two feet in thickness

But even this mode of treatment is not free from objection; for, first, the direct application of the dung to the plant will always alter its flavor, and very much degrade it; and, again, the capriciousness of the weather does not generally give either warning of its changes, or time to accommodate ourselves to them; they often take place in the night, and often (whether in the night or in the day) under circumstances which prevent us from giving the plant the additional covering it may require. Two other methods, therefore, not dissimilar in themselves, have been suggested—the one to employ hollow cylinders of earthenware, covered with a tile or piece of slate, and of capacity sufficient to embrace the plant; the other to form caps of straw (such as are used for lodging bees), and having a movable top of the same material. To the last method we see no room for objection; in application it is easy, requiring no skill and but little labor, while the material and workmanship are both cheap and durable, and their property of excluding rain, snow and frost not to be doubted."

Spring dressing.—"In spring, the litter and earth being removed in March or April (April or May in this country), according to the season, the stocks are examined; and two or three of the strongest or best shoots being selected for growing, the rest are removed by pressure with the thumb, or by a knife or wooden chisel. These shoots, or suckers, are used for new plantations. Dig the whole ground level, loosening it to the crown of the roots of every plant."—*Loudon.*

Duration of the plants.—"Artichoke plants continue productive for several years; but, every season, some well rotted dung, or fresh sea-weed, should be delved into the ground at the winter dressing. It is certain, however, that after a few years the plants begin to degenerate, the heads becoming smaller and less succulent. It is therefore a general rule not to keep an artichoke plantation beyond four or, at most, six years. Scarcely any kind of grub or wire-worm ever touches the roots of artichokes; they form, therefore, an excellent preparative for a crop of onions, shallot or garlic. In many gardens, a small new plantation is formed every year; and in this way the artichoke season, which begins in June, is prolonged till November; those from the old stock continuing till August, when those from the new stocks come in. If the last gathered be cut with the stems at full length and if these be stuck among moist sand, the heads may be preserved a month longer.

Seed.—"The heads, when suffered to remain ten days or a fortnight after the season of cutting, expand the calix leaves, and display an aggregation of jagged purple florets, producing a fine appearance. When ripe seed is wanted, those heads in flower are to be bent down, and retained in that position, so that the calix may throw off the autumnal rains. In general, however, the seed is not perfected in our [the British] climate."—*Loudon.* Armstrong says, "Every gardener who understands his trade will take care to set apart a few of the finest heads of his own crop for seed; but as the stock is upright, and the head so formed as to receive and hold water, it often happens that the seeds rot. To prevent this, the stems of the plants so set apart should be tied to stakes driven into the ground near them, and gradually bent, so as to give to the heads that degree of declination that will be sufficient to carry off the water that may fall upon them."

Use.—In England, the full heads only are eaten, always boiled. In Italy, they eat the young heads raw, with oil, salt and pepper. The stalks are eaten in France and Germany, boiled and seasoned with butter and vinegar. The flowers have the property of rennet, and have sometimes been used as a substitute for that article.

ASPARAGUS.

Asparagus Officinalis.—*Asperge*, Fr.—*Spargel*, Ger

Soil.—Asparagus ground should be light, yet rich: a sandy loam, well mixed with rotten dung or sea-weed, is recommended.

Preparation.—A good quantity of dung trenched twelve or fifteen inches below the surface.

Propagation.—It is best to raise this plant from seeds, although the sprouts from seeds will not be fit to cut so soon by a year as from the roots. The seeds should be dead ripe when gathered, and taken from the strongest and most compact shoots.

Quantity of seeds or roots.—If sown to transplant, for a bed four feet and a half wide by six feet in length, one quart of seed will be requisite. If sown to remain, for a bed four feet and a half wide by thirty feet in length, one pint is necessary. If plants a year old are wanted for a plantation, then for a bed four feet and a half wide by thirty feet in length, to contain four rows of plants nine inches distant in the row, one hundred and sixty plants will be requisite. The seeds may be sown as early as the season will permit in the spring, or (according to Cobbett) "three weeks, or about, before the frost sets in" in the fall—and "press the earth well down about the seed; and, as soon as the frost sets in, but not before, cover the ground with muck or litter a foot deep, and lay some boards or poles to prevent its blowing off. As soon as the frost breaks up in the spring, take off the litter, and you will have the plants quickly up."

Progressive culture.—In the month of March or April, (during the whole existence of the plant,) the beds must be carefully forked and dressed, and kept clear of weeds. Occasional waterings are necessary, till the third or fourth year, when the plants will be sufficiently established to do without them. Permit the entire crop the first two years, and the greater part of it the third year, to run up to stalks. It is a common practice to sow onions, lettuce, &c. the first two years. Mr. Loudon, however, says, "the advantage of this practice is questionable; and, at all events, it should not be continued after the plants are in full bearing."

Time of cutting.—"If you plant roots, the shoots may be cut the second year after; if seeds, they will not be fit to cut till the third year. All the shoots, which come up before the middle of June, may be cut off without injuring the roots; after which time, the late shoots should be left to run up, and go to seed; otherwise the roots will be weakened."—*Deane.*

Cutting and gathering.—"In new plantations, be careful not to begin cutting till the stools have become mature, or the third or fourth year. Likewise observe, both in old and new beds, to gather all the produce in a regular, successive order, within the proper limits of the season. As the rising shoots project two, three, four or five inches, at most, above the ground, while the top bud remains close and plump, they are in the best condition for gathering. Cut them off within the ground, with a narrow, sharp-pointed knife, or small saw, nine inches long; thrusting the knife or saw down straight, close to each shoot separately, cut it off slantingly, about three inches below the surface, with care not to wound the young buds advancing below. Observe in a new plantation, in the first year's gathering, if the shoots come up of irregular sizes, to cut only some of the larger for a fortnight, or three or four weeks, and then permit the whole to run; but otherwise when in strong production, gather all as they come, two or three times a week, or as required during the season, till the 21st of June; then, at furthest, terminate the cutting, and permit the after-shoots to run up in stalk till October. If, from a particular inducement, you cut later than the 21st of June, be careful to leave two or more shoots to each stool, in order to draw nourishment to it; for the stools left without growing shoots will perish; and, by negligence in this respect, many vacuities or unproductive spots are left in beds."

Shaker method.—"Beds should be made as soon as the ground is clear from frost—the first part of April, in ordinary seasons. The ground must be well worked to the depth of a spade blade, and intimately mixed with rotted horse-manure. The seeds should then be sowed in rows or drills, twenty inches apart, and one inch deep, the rows crosswise of the beds. They should be raked in lengthwise of the rows.

"Asparagus will be large enough to begin to cut the third spring after it is sowed. It may be cut until the 20th June every year afterwards. As soon as the cutting season is over, hoe it over lightly, so as to loosen the soil and make the surface even. Every other year, spread on each bed an inch layer of good yard-manure before hoeing. The tops will now grow to a great size, and mostly seed well. Early in the spring, cut the dry tops close to the ground, lay them evenly on the beds, and burn them there. Then hoe the beds over, and rake them again They are then prepared for a new growth.

" Most of the English books recommend breaking up old asparagus beds once in a certain number of years. Some of the Shakers' beds have been cut twenty-five years, and under that course of treatment are as good as they ever were."

BALM.

Melissa officinalis.—Baume, Fr.

"The balm is a hardy perennial, with square stems, which rise two feet high or more, furnished with large ovate leaves, growing by pairs at each joint. It is a native of Switzerland and the south of France, produces flowers of a purplish color from June to October." There is a variety with hairy leaves.

Propagation.—" It is readily propagated by parting the roots, preserving two or three buds to each piece, or by slips, either in autumn or spring."—*Loudon.*

Culture.—" Plant the slips or sets in any bed of common earth, by dibble or trowel, and from eight inches to a foot apart, giving water if dry weather. Those of the spring planting will soon grow freely for use the same year; and afterwards will increase by the root into large bunches of several years' continuance, furnishing annual supplies from March to September."—*Loudon.*

Dried Balm.—" Gather when coming into flower, and when the leaves are entirely free from dew or moisture; then dry rapidly in the shade, or better in an oven; and when cool press the herbage into packages, and wrap them up in white paper till wanted for use. Keep the packages dry, and in a close drawer."—*Loudon.*

Use.—" Formerly the balm was held in very high estimation: Paracelsus supposed it to possess virtues, by which human life could be prolonged beyond the usual period. In modern times, however, the properties of this agreeable plant are better understood: it yields, by distillation, a small proportion of an essential oil, of a yellowish color, and a very grateful smell. A few drops of this oil, diluted in a glass of simple water, or strong infusions of the young shoots, drank as a tea, and continued for several weeks or months, have proved of service to nervous and hypochondriacal patients, of a lax and debilitated habit. Either of these liquid preparations, when slightly acidulated with lemon juice, acquires a fine reddish colour, and may be taken with advantage in dry, parching fevers, as well as in cases of distressing flatulency, attended with eructations, where the first passages have previously been opened."—*Dom. Ency.* vol. i. p. 127.

BEANS.

Phaseolus.—Haricot, Fr.—*Schminkbohne,* Ger.

There are two distinct species of the bean, which are often confounded by writers on agricultural subjects, to wit, *vicia faba*, garden bean, or horse bean, and *phaseolus vulgaris*, or kidney bean. The want of distinguishing between these two different genera or sorts of plants, may lead to erroneous practices, and consequent detriment to the cultivator.

The *vicia faba*, or garden bean, (often called *English bean*,) is an annual plant, rising from two to four feet high, with a thick, angular stem, the leaves divided, and without tendrils; the flowers white, with a black spot in the middle of the wing; seed-pods thick, long, woolly within, and inclosing the large ovate flatted seeds, for the sake of which the plant is cultivated in gardens. The following varieties are advertised for sale in Mr. Russell's Catalogue, viz.

English dwarfs,
Early mazagan,
Sword long pod,
Green nonpareil,
Broad Windsor.

" These varieties should be planted as early as practicable in April."

It is said that this kind of bean is propagated to the best advantage in a stiff, moist loam, with a considerable proportion of clay. The following are Mr. Loudon's directions for its culture:—

Quantity of seeds.—For early crops, one pint of seed will be requisite for every eighty feet of row; for main crops, two quarts for every 240 feet of row; and for late crops, nearly the same as the early.

Method of sowing.—" Plant all the sorts in rows, two feet and a half apart, for the smaller or very early or very late kinds; and three feet for the larger; the smaller beans two inches deep, and three inches distant in the row; the larger three inches deep, and four inches distant in the row."

Transplanting.—Speechly constantly transplants his early bean crops, and considers that this plant may be as easily transplanted as cabbage, or any other vegetable. It is a practice with him to plant beans, alternately with potatoes, in the same row; the rows three feet apart, and the potatoes eighteen inches apart in the row, so that the beans are nine inches from the potatoes. The beans are transplanted, by which means they have the start and advantage of the potatoes and weeds, and, as they come in early, may be gathered before they can possibly incommode or injure the potatoes.

Manual process.—The work of sowing is most generally effected by a dibble, having a thick, blunt end, to make a wide aperture for each bean, to admit it clear to the bottom, without any narrow, hollow parts below strike the earth fully and regularly into the holes over the inserted beans. Or the planting may be performed, occasionally, in drills drawn with a hoe the proper depth and distance as above; place the beans at intervals along the bottom of each drill, and earth them over evenly; which method though suitable to any kinds, may be more particularly adopted in sowing the early and other small sorts.

Soaking seed in summer.—In planting late crops in June or July, if the weather be dry, it is eligible to give the beans a previous soaking for several hours in soft water; or, if they are to be sown in drills, water the drills beforehand; then directly put in the beans, and earth them in while the ground remains moist.

Subsequent culture.—" As the plants come up, and advance from four to six inches high, hoe up some earth to the stems on both sides of each row, cutting down all weeds. Repeat the hoeing as future weeds arise, both to keep the ground about the plants clean, and to loosen the earth to encourage their growth. In earthing up, great care must be taken that the earth does not fall on the center of the plant, so as to bury it; for this occasions it to rot or fail. After earthing up, stir between the rows with a three-pronged fork. As the different crops come into full blossom, pinch or cut off the tops, in order to promote their fruiting sooner in a more plentiful production of well-filled pods."—*Abercrombie.*

Nicol says, " Topping is unnecessary for any but the early crops; being practiced to render them more early." Mr. Armstrong is of opinion, that " of this practice, and of the theory on which it is founded, we may be permitted to doubt, because it does not appear to follow that, when the growth of a plant is checked or suspended in one direction, it will not exert itself in another as injuriously to the crop as any increased length of stem would have done. Every day's experience shows, that, if we pollard an apple-tree, we indeed stop its growth upward; but that, instead of sending its surplus juices to the support and enlargement of the fruit, (as this practice supposes,) it hastens to throw out lateral stems or suckers, which give no fruit whatever. Our creed, therefore, is, that, in the vegetable economy, certain juices go to the production of the stem, and certain others, more elaborated, and of a different quality, to that of flowers and fruits, and that, whether desirable or not, the art of giving to either a destination different from what nature intended, is yet to be discovered."

Gathering.—For table use, gather only such as are tender, the seeds decreasing in delicacy after they obtain about half the size which they should possess at maturity When they become black-eyed, they are tough and strong tasted, and much inferior.

To save seed.—" Either plant some of the approved sorts early in the spring, wholly for that purpose, or leave rows of the different crops ungathered, in preference to the gleaning of gathered crops. The pods will ripen in August, becoming brown and dry, and the beans dry and hard; then, pulling up the stalks, place them in the sun to harden the seed thoroughly, after which thresh out each sort separately."—*Abercrombie.*

Use.—Mr. Cobbett says, " In England there are some sorts of this bean used for horses and hogs; but there are several sorts used as human food. It is at best a coarse and not very wholesome vegetable, yet some people like it. It is very much eaten by the country people, in England, with their bacon, along with which it is boiled." Bean flour, as Dr. Darwin observed, is probably more nutritive than that of oats, which appears by its effect in fattening hogs; and, from the relative prices of these articles, he was of opinion, that peas and beans, in general, supply a cheaper provender for horses and other animals. But as the flour of beans and peas is more oily than that of oats, it must be more difficult of digestion. Hence, when a horse has been fed with pulse, he will be less active for an hour or two afterwards, than if he had eaten oats. It will, therefore, be advisable to mix pollard or straw, finely cut, with peas and beans, before giving to cattle.

Bean, Kidney.—This plant and its uses are too well known to require any description. The sorts mentioned in Russell's Catalogue, are *Kidney dwarfs, or string:*—early yellow cranberry; early Mohawk, (which will bear a smart frost without injury;) early yellow six weeks; early Canadian dwarf; early dwarf cluster; early dun colored, or Quaker; early China dwarf; large white kidney dwarf; white cranberry dwarf; red cranberry dwarf; Warrington, or marrow; refugee, or thousand to one; Rob Roy; white cutlass bean of Carolina. *Pole or running beans:*—large white Lima; saba or Carolina; scarlet runners; white Dutch runners; Dutch case-knife, or princess; red cranberry; white cranberry; (the three last mentioned string beans;) asparagus, or yard long, *dolichos sesquipedalis.*

The following directions for the culture of the bean in gardens are from McMahon: " Towards the latter end of April, [or the fore part of May in New England,] you may plant a first crop of kidney-beans in the open ground. Select a warm, dry and favorably situated spot, and, having dug and manured it properly, draw drills an inch deep, and two feet or thirty inches asunder, drop the beans therein two inches apart, and draw the earth equally over them; do not cover them more than an inch deep; for at this early time they are liable to rot, if cold or wet ensue. The kinds proper to be sown now are, the early cream-colored, speckled, yellow and white dwarfs."

Loudon gives the following directions for the culture of *runners* or *pole-*

beans, as they are commonly called in this country:—The runner kidney beans may be sown in a small portion towards the end of April, [about the middle of May in New England,] if tolerably warm, dry weather; but as these beans are rather more tender than the dwarf sorts, more liable to rot in the ground by wet and cold, especially the scarlets, the beginning or middle of May [first of June in New England] will be time enough to sow a considerable crop; and you may sow a full crop about the beginning of June. Allot principally the scarlet and large white runners. Some Dutch runners are very eligible as a secondary crop. The first crops should have the assistance of a south wall. Intermediate crops may be sown in any open compartment, or against any fence not looking north. The latest sown will continue bearing longer under a good aspect and shelter. In sowing, draw drills about an inch and a half, or not more than two inches deep. Let parallel rows be at least four feet asunder, to admit in the intervals tall sticks or poles for the plants to climb on. Place the beans in the drills, four inches apart, and earth them in evenly the depth of the drills. A row contiguous to a fence or building may ascend upon lines. Some may be sown in a single row along a border, or on each side of a walk, and have the support of a slight trellis of laths and lines; or they might be arched over with similar materials to form a shady walk or bower. In a cold, wet season, or when requisite to have a few plants more forward than the general crop, some scarlets may be sown in April, either in a slight hot-bed, or in pots, under frames of hand glass, to raise and forward the plants, till two or three inches high: then, at the end of May, transplant them into the open garden. As the plants come up, and advance from three to six inches in growth, hoe some earth to the stems, cutting down all weeds. When they begin to send forth runners, place suitable supports to each row; and conduct the tendrils to the sticks or lines, turning them in a contrary direction to the sun. The ascending plants will soon come into flower, podding at the joints, in long succession. They are so prolific, that the returns from three sowings, in May, June and July, will last from July till October.

Taking the Crop.—Gather the pods, both from dwarfs and runners, while they are young, fleshy, brittle and tender, for then they are in the highest perfection for the table; and the plants will bear more fully, and last longer in fruit, under a course of clean gathering.

To save seed.—Either sow a portion for that object, or leave rows wholly ungathered, of the main crop, or preserve a sufficiency of good pods promiscuously. The beans saved should be the first fruits of a crop, sown at a period which throws the entire course of growth into the finest part of summer. Let them hang on the stalks till they ripen fully, in August and September; then let the haulm be pulled up and placed in the sun, to dry and harden the seed, which should be afterwards cleared out of the husks, bagged up and housed.

The pea, English bean, and kidney bean are liable to the attacks of various insects, especially the *aphides*, [plant lice,] in dry seasons. When early crops are newly sown, or planted, mice will burrow for and eat the seed, and when it begins to penetrate the soil, it is attacked by snails, slugs, the cut worm, &c. The usual means of guarding against the ravages of insects must, therefore, be resorted to by the gardener.

As regards the field culture of the bean, we would observe, that the white kind, which is most generally approved of in New England, will produce pretty good crops, on poor, sandy, or gravelly soils; but when planted on such ground, it is good husbandry to wet and roll them in plaster before planting. They may be planted in hills or drills, the rows two and a half or three feet apart, according to the strength of the soil, and cultivated like other hoed crops. They may be planted in the latter end of May, or beginning of June, or about the time of planting Indian corn. If planted in hills, they may be placed from fourteen to twenty-four inches apart in the rows, and the rows the distance before mentioned. Five beans are quite enough to remain in a hill. Hogs' dung, mixed with ashes, is said to be the best manure for them, and it is said to be very injurious to beans to hoe them while the dew is on, or in wet weather.

Judge Buel, of Albany, has given the following notices of some experiments in the field culture of this vegetable:—" Beans may be cultivated in drills or in hills. They are a valuable crop, and, with good care, are as profitable as a wheat crop. They leave the soil in good tilth. The China bean, with a red eye, is to be preferred. They ripen early, and are very productive. I cultivated beans the last year in three different ways, viz., in hills, in drills, and sowed broad-cast. I need not describe the first, which is a well-known process. I had an acre in drills, which was the best crop I ever saw. My management was this:—On an acre of light ground, where the clover had been frozen out the preceding winter, I spread eight loads of long manure, and immediately plowed and harrowed the ground. Drills or furrows were then made with a light plow, at the distance of two and a half feet, and the beans thrown along the furrows about the 25th of May, by the hand, at the rate of at least a bushel on the acre. I then gauged a double mould-board plow, which was passed once between the rows, and was followed by a light one horse roller, which flattened the ridges. The crop was twice cleaned of weeds, by the hoe, but not earthed. The product was more than forty-eight bushels, by actual measurement. The beans brought me one dollar the bushel last fall. The third experiment was likewise upon a piece of ground where the clover had been killed. It was plowed about the first of June, the seed sown like peas, upon the first furrow, and harrowed in. The drought kept them back; but about 65 rods of ground, on which the experiment was made, gave a product of twelve and a half bushels. The crop was too ripe when it was harvested.

and as it was cut with a scythe, I estimated that about two and a half bushels were left upon the ground. No labor was bestowed upon them from the time they were sown till they were harvested."

Forwarding an early crop.—The kidney bean is often partially forced, in hot-houses or frames, with a view to the forwarding of its produce in the open garden. Mr. Armstrong says, "In the neighborhood of cities, the dwarf varieties are often cultivated in hot-beds, but the product is of a very inferior kind; for, of the whole catalogue of vegetables, none is more apt to take a disagreeable flavor from hot and fermenting dung (which is the basis of these beds) than the bean." It is probable, however, that beans might be forced to advantage, in hot-beds, composed of oak leaves, tanner's bark, &c., without deriving therefrom the disagreeable flavor complained of

BEET.

Beta Vulgaris.—*Beterave*, Fr.—*Rothe Rübe*, Ger.

AMONG the more common varieties of this valuable vegetable are,

French sugar, or amber beet,
Mangel wurtzel,
Green—for stews or soups,
Yellow turnip-rooted,
Early blood turnip-rooted,
Early dwarf blood,
Early white scarcity,
Long blood red.

Sown from April to June. The early turnip blood beet is the earliest, and of excellent quality for summer use; the tops being good for boiling as greens. Mr. Loudon's directions for the general culture of the beet are:—

"*Seed and Soil.*—The beet is always raised from seed, and for a bed four feet and a half by twelve feet, one ounce is requisite. The soil in which it naturally delights is a deep, rich sand, dry and light, rather than moist. Sowing in seed beds, and transplanting has been tried; but though it may answer for spinage or pot-herb beets, [white and its varieties,] it will not answer where the object is a large clean root.

"*Sowing.*—The beet is sown annually the last week in March, or beginning of April, [in the northern United States, the main crop should be delayed till the middle of May.] The ground on which it is sown should have been previously enriched by mellow compost and sea sand; but rank dung is not to be laid in, as it is apt to induce canker. For the long-rooted kind, trench to the depth of eighteen inches. Sow either broad-cast on the rough surface, and rake well into the earth; or, as the seed is large, sow in drills an inch or two deep and a foot asunder; or dot it in with a thick, blunt-ended dibble in rows that distance, making holes ten or twelve inches apart, about an inch and a half deep; drop two or three seeds in each hole, but with the intention to leave only one beet plant."

Mr. Mahon says, "Make choice of a piece of rich, deep ground, lay it out into four feet wide beds, push the loose earth into the alleys, then sow the seed tolerably thin, and cover it with the earth out of these alleys to about three quarters of an inch deep. Or, let drills be drawn with a hoe, near an inch deep, and a foot or a little better asunder; drop the seeds thinly therein and cover them over the same depth as above. Or you may sow the seed on a piece of ground rough, after being dug, and rake it well in."

Subsequent culture.—When the young plants are advanced into leaves, one, two, or three inches in growth, they must be thinned and cleared from weeds, especially those sown promiscuously, or broad-cast and in drills. If there be chasms in the rows, fill them up with the superfluous plants. The oftener the ground is stirred during the whole course of the vegetation of the plant, the larger will be the product, and the better its quality.

As soon as vegetation is over, which always occurs after the first hard frost, take up the plants, expose them a day or two to the air, to evaporate their surplus moisture, and then house them carefully. This may be done by putting them in layers in a dry cellar, and interposing between these a slight covering of sand. In digging the roots, great care should be taken that they be not broken or cut, as they bleed much. For the same reason, the leaves should be cut off at least an inch above the solid part of the root.

To save seed.—Either leave a few strong roots standing in the rows, or select a few, and transplant them to a spot where there will be no danger, when in flower, of being impregnated with any other variety. They will shoot up the second year, when their flower-stocks should be tied to stakes, to prevent their breaking over.

Field culture of the mangel wurtzel beet, and the sugar beet.—Soil and preparation —The soil for these roots should be a loam inclining to clay, in good tilth, well manured, and made fine to a good depth. John Hare Powel, Esq., corresponding secretary to the Pennsylvania Agricultural Society, in giving an account of his mode of cultivating this crop, says, "My soil was not naturally strong: it has been gradually so much deepened as to enable Wood's plow, No. 2, drawn by four oxen, to plow fourteen inches deep. Fresh barn-yard manure was equally spread upon the surface, and plowed under in the early part of April, in quantities not larger than are generally used for potato crops in this country. Early in May, the land was twice stirred with Beatson's scarifier, harrowed, rolled; after stirred, harrowed and rolled again in the opposite direction." The soil on which Messrs. Tristram Little and Henry Little of Newbury, Mass. raised their premium crop in 1824, is a clay loam. In 1823, about three-fourths of the same was sowed with onions, and manured with about eight cords of compost manure to the acre. The other quarter was sowed with wheat without manure. In the fall of 1823, there were about ten cords of compost manure drawn on the lot, and put in a heap. Most of the said compost was drawn from the salt marshes, when ditching the same; the other part was from the barn-yard. In the month of April, 1824, the heap was thrown over, and well mixed.

Planting.—Col. Powel says, "The holes for the seeds were made by a wheel, containing pegs in its circumference, which penetrated the ground about an inch, leaving intervals of four inches; the rows were made 2 feet asunder; two capsules were dropped in each hole; the wheel of a common barrow was passed over them, thus compressing the earth, and leaving a slight rut for the retention of moisture."

Messrs. Tristram and Henry Little observe, that, "Between the 8th and 11th of May, the land was plowed and sowed in the following manner:—After one deep plowing, the ground was furrowed two and a half feet apart, and the manure put into the furrows, and covered with a double mould-board plow; a roller was then passed on the top of the ridge, and the seed dibbled in with the finger over the manure, about six or eight inches apart." The quantity of seed, according to English writers, is four pounds to an acre. Mr. David Little, in obtaining a premium crop, sowed four pounds, but observed that he thought half that quantity would have been sufficient.

Gathering and preserving.—In gathering the roots, care should be taken to cut off the leaves about half an inch above the crown, as they will not keep so well, if cut more closely. Messrs. Tristram and Henry Little say, "As to the best mode of preserving them, we have tried divers ways,—by pitting them, by putting them into a barn, and covering them with hay, and by putting them into the cellar; the last mode we think the best." Col. Powel observes, that one of his crops was "piled in a cellar, in rows, as wood, and covered with sand." A writer in the *English Farmer's Journal*, observes, that he has practiced, with success, the following mode of preserving this root:—"I pack it in long heaps, about seven feet wide at the bottom. I begin by forming the outsides with the roots, not stripped of their tops; tops outwards; the internal parts to be filled with roots without leaves; continue one layer over another, until the heap is about six feet high, and about two feet broad at top, which may be covered with straw and earth; the ends of the heap should be covered in the same way; the leaves form an efficient covering against rain and frost."

Mr. M'Mahon's mode of preserving beets, and other roots, is as follows:—"Previous to the commencement of severe frost, you should take up, with as little injury as possible, the roots of your turnips, carrots, parsnips, beets, salsify, scorzonera, Hamburg or large-rooted parsley, skirrets, Jerusalem artichokes, turnip-rooted celery, and a sufficiency of horse-radish, for the winter consumption; cut off their tops, and expose the roots for a few hours till sufficiently dry. On the surface of a very dry spot of ground, in a wel' sheltered situation, lay a stratum of sand two inches thick, and on this a layer of roots of either sort, covering them with another layer of sand, (the drier the better,) and so continue layer about of sand and roots till all are laid in, giving the whole, on every side, a roof-like slope; then cover this heap or ridge all over with about two inches of sand, over which lay a good coat of drawn straw, up and down, as if thatching a house, in order to carry off wet, and prevent its entering the roots; then dig a wide trench round the heap, and cover the straw with the earth so dug up, to a depth sufficient to preserve the roots effectually from frost. An opening may be made on the south side of this heap, and completely covered with bundles of straw, so as to have access to the roots at all times, when wanted either for sale or use.

" Some people lay straw, or hay, between the layers of roots, and immediately on the top of them; this I do not approve of, as the straw or hay will become damp and mouldy, and very often occasion the roots to rot, while the sand would preserve them sweet and sound.

" All these roots may be preserved in like manner in a cellar; but in such a place they are subject to vegetate and become stringy earlier in spring. The only advantage of this method is, that in the cellar they may be had when wanted, more conveniently during winter, than out of the field or garden heaps.

BENE PLANT.

Sesamum.

This was introduced into the Southern States by the negroes from Africa. It abounds in many parts of Africa. Soninni and Brown, travelers in Egypt, say it is much cultivated there for the purpose of feeding horses, and for culinary purposes. The negroes in Georgia boil a handful of the seeds with their allowance of Indian corn. Probably no plant yields a larger proportion of oil, which Dr. Cooper of Philadelphia has pronounced equal to the finest oils. But it is worthy of cultivation in the Northern States, principally, as a medicinal plant. A gentleman in Virginia has given Messrs. Thorburn & Son the following account of its virtues:—" It requires to be sown early in April, at a distance of about one foot apart. A few leaves of the plant, when green, plunged a few times in a tumbler of water, make it like a thin jelly, without taste or color, which children afflicted with the summer complaint will drink freely, and it is said to be the best remedy ever discovered. It has been supposed, that (under Providence) the lives of three hundred children were saved by it last summer in Baltimore, and I know the efficacy of it by experience in my own family." This plant will throw out a great profusion of leaves by breaking off the top when it is about half grown.—*Russell's Catalogue.*

BORECOLE

Brassica oleracea.—Chou vert, Fr.—*Grüne Kohl,* Ger.

The Borecole contains several sub-varieties, the common characteristic of all which is an open head, sometimes large, of curled or wrinkled leaves, and a peculiar, hardy constitution. There are fourteen varieties enumerated by Loudon. Those which he says are the most valuable, are the green borecole, Scotch kale, or Siberian borecole, the purple or brown kale, the German kale, German greens, or curlies.

Propagation.—All the sorts are propagated by seed; and for a seed bed four feet by ten, Abercrombie says, one ounce of seed is necessary. M'Mahon directs to "sow towards the end of March [about three weeks later in New England] a first crop of borecole for autumn service," and observes:

"There are two principal sorts, the green and the brown, both very hardy plants, with tall stems, and full heads of thick fimbriate, curled leaves, not cabbaging, and are desirable open greens for winter, &c. Let this seed be sown in an open exposure, distant from trees, and from close fences, as, in such situations they are apt to draw up too fast, with long, weak stalks; sow it broad-cast, and rake it in." Several crops may be sown in several successive months, from the middle of April to the middle of September. In dry weather, water the plants occasionally, both before and after they are up "When about three inches high, it will be proper to thin the seed bed, and prick out a quantity therefrom, at four inches distance, that the whole may obtain proper strength for final transplanting.

"When the plants are set in the places where they are to complete their growth, they should be planted out like cabbages, at three feet distance every way, and afterwards be kept free from weeds, and the earth drawn to their stems as they advance in growth. Those intended for winter use should not be planted in a rich, fat loam, as there they would become too succulent, and consequently could not bear the frost as well as if growing on a gravelly soil. Such as are designed for autumn use, may be planted in any convenient bed that is tolerably rich.

"The green and brown curled borecole, being very hardy, will require little protection [against the cold of winter]. In November they may be taken up, and planted in a ridge tolerably close together, and, during severe frost, be covered lightly with straw; this will preserve them sufficiently and during winter the heads may be taken off as they are wanted for use the stems, if taken up and planted in rows, as early in March as the weather will admit, will produce abundance of the most delicious sprouts.

"In the Southern States, and even in warm soils and exposures in the Middle States, borecole will stand the winter in open beds, without any covering whatever."—*M'Mahon.*

Use.—The crown or center of the plant is cut off, so as to include the leaves which do not exceed nine inches in length. It boils well, and is most tender, sweet and delicate, provided it has been duly exposed to frost.—*London.*

BROCCOLI.

Brassica oleracea.—*Broccoli*, Fr.—*Italianische Kohl*, Ger.

There are several varieties of broccoli, which are all merely late-heading varieties of the cauliflower. Miller mentions the white and purple broccoli, as imported into England from Italy; and it is thought that from these two sorts all the subsequent kinds have arisen, either by accidental or premeditated impregnations. The kinds introduced into this country are, the early white, early purple, and large cape.

The seeds of broccoli should be sown in New England about the latter end of May, or beginning of June; and when the young plants have germinated eight leaves, they should be transplanted into beds. By this management, towards the latter end of July, they will be fit to be planted out in some well sheltered piece of ground, at the distance of a foot and a half in the rows, and two feet between each row.

The soil proper for broccoli is rather light than heavy. M'Mahon says, the early purple broccoli, if sown early in April, and planted out as you do cabbage, in good rich ground, will produce fine heads in October or November, very little inferior to cauliflowers, and, by many, preferred to them: the white will not flower so early, and, in the Middle and Eastern States, must be taken up in November, and managed as directed in that month, [see "*preserving cabbages*," &c. under the article Cabbage, in the following pages,] by which a supply of this very delicious vegetable may be had, in great perfection, during all the winter and spring.

"In such of the Southern States, as their winters are not more severe than in England, they will stand in the open ground, and continue to produce their fine flowers, from October to April. In the Middle, and especially the Eastern States, if the seeds are sown early in March on a hot-bed, and forwarded as is done with cauliflowers and early cabbage plants, and planted out finally in April, it would be the most certain method of obtaining large and early flowers."

Insects and diseases.—"In old gardens, infested, as is often the case, with an insect which in summer insinuates itself into the roots of all the *brassica* tribe, and causes the disease called the *club*, trenching the ground deep enough to bring up four or six inches of undisturbed loam or earth, will probably bury the insects too deep for mischief, and provide fresh ground for the benefit of the plants. In gardens much exhausted by reiterated croppings, if this mode cannot be adopted, a good quantity of fresh loam from a common field, dug in, would materially improve the broccoli, and be of lasting use in future crops. Broccoli, in general, succeeds best in a fresh, loamy soil, where it comes, I think, more true in kind, and is hardier without dung; but if this situation cannot be had, deep digging, with plenty of manure, is the only remaining alternative to produce good crops. I believe soap ashes, dug into the ground in considerable quantities, to be a good preservative from the club; and if the roots of the plants, just previously to planting, are dipped and stirred well about in mud of soap ashes with water, its adherence will, in a great measure, preserve them from attack; perhaps a mixture of stronger ingredients, such as soot, sulphur, tobacco, &c. would be still better."—*Hort. Trans.* vol. iii.—*See* CABBAGE.

Wood, a writer in the *Caledonian Horticultural Memoirs*, says, he paid a considerable degree of attention to the culture of broccoli, and has made considerable progress therein. He found that manuring with a compound of sea-weed and horse-dung produced the largest and finest heads he had seen for many years.

Culture without transplanting.—"M'Leod grows cape broccoli, in a very superior manner, without transplanting. In the end of May, after having prepared the ground, he treads it firm, and, by the assistance of a line, sows his seed in rows two feet apart, dropping three or four seeds into holes two feet distant from each other in the row. When the seeds vegetate, he destroys all except the strongest, which are protected from the fly by sprinkling a little soot over the ground; as the plants advance they are frequently flat hoed until they bear their flowers; they are once earthed up, during their growth. A specimen of broccoli, thus grown, was exhibited to the Horticultural Society; the head was compact and handsome, measuring two feet nine inches in circumference, and weighing when divested of its leaves and stalks, three pounds; the largest of its leaves was upwards of two feet long. M'Leod adopts the same mode in the cultivation of spring-sown cauliflowers, lettuces, and almost all other vegetables, avoiding transplanting as much as possible."—*Hort. Trans.* vol. iv, p. 559.

To save seed.—Wood, already mentioned, selects the largest, best formed, and finest heads, taking particular care that no foliage appears on the surface of the heads; these he marks, and, in April, lays them by the heels in a compound of cleanings of old ditches, tree leaves, and dung. When the head begins to open and expand, he cuts out the center, leaving only four or five of the outside shoots to come to seed. Lifting, [taking up,] he says, prevents them from producing proud seed, as it is called, or degenerating.—*Caled. Hort. Mem.* vol. ii. p. 267. Abercrombie says, broccoli seeds degenerate in this country, [England,] and that the best seed is obtained from Italy.—*Loudon.* The common directions are, in substance, as follows:

Reserve a few of the largest heads of the first crop, stripping constantly off all under shoots, leaving only the main stem to flower and seed, and tie them to strong stakes, to prevent their being broken by winds and heavy rain. Care should be taken that no other sort of cabbage is suffered to go to seed near them.

Use.—The same as the CAULIFLOWER, which see in its alphabetical order

BRUSSELS SPROUTS.

Brassica oleracea.—*Chou de Bruxelles*, Fr.—*Sprossen Kohl*, Ger.

THE Brussels sprouts produce an elongated stem, often four feet high, from which sprout out shoots, which form small green heads, like cabbages in miniature, each being from one to two inches in diameter, and the whole ranged spirally along the stem, the main leaves of which drop off early. The top of the plant resembles that of a Savoy, planted late in the season; it is small, and with a green heart of little value. Van Mons says, (*Hort. Trans.* vol. iii,) "If this vegetable be compared with any other, which occupies as little space, lasts as long, and grows as well in situations generally considered unfavorable, such as between rows of potatoes, scarlet runners, or among young trees, it must be esteemed superior in utility to most others." Nicol considered it deserving a more general culture in Scotland.

Use.—The sprouts are used as winter greens; and at Brussels they are sometimes served at table with a sauce composed of vinegar, butter and nutmeg, poured upon them hot, after they have been boiled. The top, Van Mons says, is very delicate when dressed, and quite different in flavor from the sprouts.

Culture.—The plants are raised from seed, of which an ounce may be requisite for a seed bed, four feet by ten feet. Van Mons, in his paper already referred to, says, "The seed is sown in the spring, under a frame, so as to bring the plants forward; they are then transplanted into an open border with a good aspect." By thus beginning early and sowing successively till late in the season, he says, "we contrive to supply ourselves in Belgium with this delicious vegetable full ten months in the year; that is, from the end of July to the end of May." The plants need not be placed at more than eighteen inches each way, as the head does not spread wide, and the side leaves drop off. In this, as in every other respect, the culture is the same as that of the borecole.

Gathering the crop.—Morgan says, the sprouts must have some frost before gathered; but this Van Mons assures us is an erroneous opinion. In Belgium, the small cabbages are not esteemed if more than half an inch in diameter. It is usual to cut off the top about ten or fifteen days before gathering from the stem. In spring, when the sprouts are disposed to run to flower, their growth is checked by taking up the plants, and setting them in the ground in any shaded spot.

To save seed.—Van Mons says, it is usual to save seeds indiscriminately from plants which have and those which have not been topped; but that he intends to save from the tops only, hoping thereby to improve the progeny. Whatever mode be adopted, the grand object is to place the plants where they will be in no danger of receiving the farina of any other of the *brassica* tribes.—*Loudon*

CABBAGE.

Brassica Oleracea.—*Chou Pomme*, Fr.—*Weiss Kopfkohl*, Ger.

The cabbage tribe is of all the classes of cultivated culinary vegetables the most ancient, as well as the most extensive. The *brassica oleracea*, being extremely liable to sport or run into varieties and monstrosities, has, in the course of time, become the parent of a numerous race of culinary productions, so very various in their habit and appearance, that to many it may appear not a little extravagant to refer them to the same origin. Besides the different sorts of white and red cabbage and Savoys, which form the leaves into a head, there are various sorts of *borecoles*, which grow with their leaves loose in the natural way, and there are several kinds of cauliflower and broccoli, which form their stalks or flower-buds into a head. All of these, with the turnip-rooted cabbage and the Brussels sprouts, claim a common origin from the single species of *brassica* above mentioned. Cabbage of some sort, White, in his History of Selborne, informs us, must have been known to the Saxons; for they named the month of February *Sprout kale.* Being a favorite with the Romans, it is probable that the Italian cabbage would be introduced at an early period into South Britain. To the inhabitants of the north of Scotland, cabbages were first made known by the soldiers of the enterprising Cromwell, when quartered at Inverness.—*Edin Ency.* art. Horticulture.

Among the varieties of the cabbage, which have been introduced into this country, the following are enumerated in Mr. Russell's Catalogue:—

Early Salisbury dwarf,
Early York,
Early Dutch,
Early sugarloaf,
Early London Battersea,
Large Bergen, or great American,
Early emperor,
Early Wellington,
Russian,
Large late drumhead,
Late imperial,
Late sugarloaf,
Large green glazed,
Tree, or thousand-headed,
Large Scotch, *for cattle,*
Green globe Savoy,
Red Dutch, *for pickling,*
Large cape Savoy,
Yellow Savoy,
Turnip-rooted, or Arabian, (above ground,)
Turnip-rooted, (below ground,)
Chou de Milan.

Soil and Situation.—Every variety of cabbage grows best in a strong, rich. substantial soil, inclining rather to clay than sand; but will grow in any soil, if it be well worked, and abundantly manured with well rotted dung. But, according to Loudon, "The soil for seedlings should be light, and excepting for early sowings, not rich. Where market gardeners raise great quantities of seedling cabbages to stand the winter, and to be sold for transplanting in the spring, they choose, in general, the poorest and stiffest land they have got, more especially in Scotland, where large autumnal sowings, of winter drumhead and round Scotch, are annually made, and where the stiffness of the soil gives a peculiar firmness of texture and hardiness of constitution to the plants, and prevents their being thrown out of the soil during the thaws which succeed a frosty winter. Transplanted cabbages require a rich mould, rather clayey than sandy; and, as Neill and Nicol observe, it can scarcely be too much manured, as they are an exhausting crop. Autumnal plantations intended to stand the winter, should have a dry soil, well dug and manured and of a favorable aspect. The cabbage, whether in the seed-bed or final plantation, ever requires an open situation. Under the drip of trees, or in the shade, seedlings are drawn up weak, and grown crops are meager, worm-eaten and ill-favored.

Sowing cabbage seed.—M'Mahon says, "The proper period for sowing cabbage in the Middle States, to produce *early* summer cabbages, is between the sixth and the tenth of September, if intended to be transplanted into frames in October, for winter protection, which is the preferable method; but if they are designed for remaining in the seed-beds till spring, the period is between the fifteenth and twentieth. However, it will be very proper to make two or three sowings within that time, as it is impossible to say whether the fall may be favorable or otherwise, and, therefore, the better way is to be prepared in either case by successive crops.

"The consequence of having crops too early is, that they are subject to run to seed in the spring soon after being planted out; and if the seeds are sown too late, the plants do not acquire sufficient strength before winter to withstand its rigor, without extraordinary care. But in either case there is a remedy; that is, if the plants are likely to become too luxuriant and strong, transplant them once or twice in October, and if too backward and weakly, make a slight hot-bed towards the latter end of that month, and prick them out of the seed-bed thereon; this will forward them considerably."

Mr. M'Mahon thinks that, in the Eastern States, the fore part of September will be a suitable time to sow cabbages intended to be grown the succeeding summer. The seeds should be covered about a quarter of an inch deep, and, if the weather prove dry, should be watered occasionally in the evening till they come up. According to Abercrombie's seed estimate, "for a seed-bed to raise the early York and similar varieties, four feet wide by twenty in length," two ounces will be required; for a seed-bed to raise the large sugarloaf, and other luxuriant growers, four feet by thirty-six in length, two ounces. The same writer directs to "sow at three different seasons, that is, spring, summer and autumn, and cover from an eighth to a quarter of an inch. Under a deficiency of winter standing young plants for final transplanting, or in order to have some spring sown plants as forward as possible, a moderate portion of some best early sorts may be sown between the middle of February and the middle of March, in a slight hot-bed or frame, to nurture the plants till the leaves are an inch or two in length. Then prick them into intermediate beds in the open garden, there to gain strength for final transplanting."

Planting in New England.—"Some drop the seeds where the cabbages are to grow. By this they escape being stinted by transplanting; for winter cabbages, the latter part of May is early enough to put the seed into the ground, whether the plants are to be removed or not. I have tried both ways, and on the whole, I prefer transplanting They are otherwise apt to be too tall, and to have crooked stems. Covering plants with leaves is not a good practice. They will be much heated through some sorts of leaves, the free circulation of air about them will be prevented, and their perspiration partly obstructed. If a hot sun cause them to droop, a shingle stuck into the ground will be sufficient shelter, if it be on the south side of the plants. I commonly allow each plant two shingles, one on the south-east side, and one on the south-west, meeting at the south corner."—*Deane.*

The act of planting should be performed carefully. Holes, of sufficient depth and width, should be dibbled, for the smaller sorts of cabbages at the distance of two feet and a half, and, for the larger sort, of three feet every way. In these the earth should be placed up to the lower leaves, and the earth brought closely about the roots, which is best done by pushing down the dibbler, at a small angle with the plant, and then bringing it up to it with a jerk. This leaves no chambering, (as gardeners call it,) no vacancy between the plant and the soil.

"The state of the weather, when these operations are performed, is not a matter of indifference, and has been a subject of controversy; some recommending dry weather, others wet. As in many other cases of disputation, the truth lies between them—that is, moist weather is neither dry nor wet, and is precisely that which is best for setting out cabbages, or any other vegetable. We ought not, however, to wait long for even this most favorable state of the atmosphere, since, with a little labor, we have the means of making up for its absence."—*Armstrong.*

"Dig the plants up, that is, loosen the ground under them with a spade, to prevent their being stripped too much of their roots. The setting stick should be the upper part of a spade or shovel handle. The eye of the spade is the handle of the stick. From the bottom of the eye, to the point of the stick, should be about nine inches in length. The stick should not be *tapering*, but nearly of equal thickness all the way down to within an inch and a half of the point, where it must be tapered off to the point. If the wood be cut away, all round, to the thickness of a dollar, and *iron* put round in its stead, it makes a very complete tool. The iron becomes bright, and the earth does not adhere to it as it does to wood. Having the plant in one hand, and the stick in the other, make a hole suitable to the root that it is to receive. Put in the root in such a way, that the earth, when pressed in, will be on a level with the butt-ends of the lower or outward leaves of the plant. Let the plant be rather higher than lower than this; for care must be taken not to put the plant so low as for the earth to fall, or be washed into the heart of the plant, nor even into the inside of the bottom leaves. The stem of a cabbage, and the stems of all the cabbage kind, send out roots from all the parts of them that are put beneath the surface of the ground. It is good, therefore, to plant as deep as you can without injury to the leaves. The next consideration is, the *fastening of the plant in the ground.* The hole is made deeper than the length of the root, but the root should not be bent, at the point, if it can be avoided. Then, while one hand holds the plant, with its root in the hole, the other hand applies the setting stick to the earth on one side of the hole, the stick being held in such a way as to form a sharp triangle with the plant. Then, pushing the stick down, so that its point go a *little deeper than the point of the root*, and giving it a little *twist*, it presses the earth against the point, or bottom of the root. And thus all is safe, and the plant is sure to grow."—*Cobbett.*

After-culture.—Little more is necessary than to stir the ground pretty frequently, and keep it clear of weeds. It is recommended to hoe the ground while the dew is on, once a week, till they begin to head.

Diseases and insects.—Cabbages are liable to a disease in the roots, in which they become swelled and knobby, and the plants of weak and imper fect growth. This disorder is called *stump foot*, *fumble foot*, &c. It has been supposed to be caused by the attacks of grubs, below the surface of the ground; and the disorder is said to be chiefly prevalent where the same sorts of cabbages have been raised on the same ground several years in succession. Lovet Peters, Esq., of Westborough, Mass., says the cause of the stump foot is in the soil:—" Few pieces of land, I believe, that have been, for several successive years, under the plow, will produce a good crop of cabbages, though there may be exceptions. My method of raising them, which I have practiced several years with complete success, is the following:—In the spring, take a piece of green sward, of a good soil, and free from stones, and turn it over with the plow as flat as possible; then spread on a large quantity of good manure: if it has been previously mixed with leached ashes, the better. Then harrow gently, and early in June: if for winter cabbage, cut holes through the turf, with a hoe, as near together as the cabbages ought to grow; fill the holes with fine earth and manure, and then set the plants, or put in a small number of seeds—I prefer the latter, however,* since it saves the labor of setting, and is much surer of success, if it happens to be a time of drought. They will need no more hoeing than is necessary to keep down the weeds. In this way, I have raised cabbages of the largest size, in a green sward potato field, without more hoeing than was necessary for the potatoes."

Cabbage plants are liable to be attacked by a grub or black worm, in the night, which eats off the stalks, just above ground, and buries itself in the ground as soon as the sun rises. Dr. Deane observed that a little circle of lime or rockweed round the plant, will preserve it, and recommends digging for the worm near the place which shows the marks of its ravages, and destroying it. Scalding the hills with boiling water, and then inclosing them with boards, barks, or shingles, would be an effectual, but troublesome mode, of guarding against worms. The *Economical Journal of France* gives the following method, which it states is infallible, to guard not only against caterpillars, but all other insects which infest cabbages or other vegetables:—Sow with hemp all the borders of the ground where the cabbage is planted; and, although the neighborhood be infested with caterpillars, the place inclosed with hemp will be perfectly free, and not one of the vermin will approach it. Watering the plants with water which had been poured boiling hot on elder leaves, or walnut leaves, and suffered to stand till cool, has been recommended. The following mixture is also said to be a preservative against all kinds of insects:—Take a pound and three quarters of soap, the same quantity of flowers of sulphur, two pounds of puff balls, and fifteen gallons of water. When the whole has been well mixed, by the aid of a gentle heat, sprinkle the insects with the liquor, and it will instantly kill them. To get rid of the *aphides* or cabbage lice, watering the plants with soap-suds, or a solution of salt in water, (not too strong, lest it kill the plants,) is said to be efficient.

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* Cultivators do not agree on the subject of transplanting cabbage plants, or sowing the seeds in the spots where the plants are to grow. Dr. Deane, as has appeared above, after having tried both methods, gave the preference to transplanting. Mr. Peters, as we have seen, prefers the other mode. Mr. Bordley relates an experiment, in which he "compared cabbages transplanted with others *not once moved*. The *unmoved* grew, and were better than the *moved*." Mr. Cobbett says, "to have *fine* cabbages of any sort, they must be *twice* transplanted. First, they should be taken from the seed-bed, (where they have been sown in beds near to each other,) and put into fresh dug, well-broken ground, at six inches apart every way. This is called *pricking out*. By standing here about fifteen or twenty days, they get straight, and stand strong, erect, and have a straight and stout stem. Out of this plantation they come *all of a size;* the roots of all are in the same state, and they strike quicker into the ground where they stand for a crop." According to *Rees' Cyclopedia*, it was the practice of the celebrated Bakewell, and other cultivators who followed his example, to drill cabbage seed where the plants were to remain. Perhaps there would be no necessity for transplanting cabbages, in order to make the stems "straight and stout," according to Mr. Cobbett's directions, if the plants were not originally sown too thick, or were properly thinned at an early period of their growth. An English writer says, "Much injury frequently arises to young cabbage plants, from the seed being sown too thick; care should, therefore, be taken, to have them properly thinned out, whenever they come up in too thick a manner. Probably, if the plants were sown in the hills in which they are intended to grow for a crop, and thinned out in due season, they would grow as straight and stout as if they had been several times transplanted."

Preserving cabbages.—Mr. M'Mahon recommends the following method for preserving cabbages for winter and spring use:—"Immediately previous to the setting in of hard frost, take up your cabbages and Savoys, observing to do it in a dry day; turn their tops downward, and let them remain so for a few hours, to drain off any water that may be lodged between their leaves; then make choice of a ridge of dry earth, in a well-sheltered, warm exposure, and plant them down to their heads therein, close to one another, having previously taken off some of their loose, hanging leaves. Immediately erect over them a low, temporary shed, of any kind that will keep them perfectly free from wet, which is to be open at both ends, to admit a current of air in mild, dry weather. These ends are to be closed with straw when the weather is very severe. In this situation your cabbages will keep in a high state of preservation till spring; for, being kept perfectly free from wet, as well as from the action of the sun, the frost will have little or no effect upon them. In such a place the heads may be cut off as wanted, and if frozen, soak them in spring, well, or pump water, for a few hours previous to their being cooked, which will dissolve the frost, and extract any disagreeable taste occasioned thereby."

The principal gardener in the Shaker establishment, in New Lebanon, Columbia county, N.Y., directs not to pull up cabbages in autumn, "till there is danger of their freezing too fast in the ground to be got up. If there happens an early snow, it will not injure them. When they are removed from the garden, they should be set out again in a trench dug in the bottom of a cellar. If the cellar is pretty cool, it will be better."

The *London Monthly Magazine* gives the following method, by which cabbages may be preserved on board ships, &c. :—"The cabbage is cut so as to leave about two inches or more of the stem attached to it; after which the pith is scooped out to about the depth of an inch, care being taken not to wound or bruise the rind by this operation. The cabbages then are suspended by means of a cord, tied round that portion of the stem next the cabbage, and fastened at regular intervals to a rope across the deck. That portion of the stem from which the pith is taken, being uppermost, is regularly filled with water."

To save cabbage seed.—"The raising of the seed of the different sorts of cabbage, Neill observes, affords employment to many persons in various parts of England. It is well known that no plants are more liable to be spoiled by cross breeds, than the cabbage tribe, unless the plants of any particular variety, when in flower, be kept at a very considerable distance from any other; also in flower, bees are extremely apt to carry the pollen of the one to the other, and produce confusion in the progeny. Market gardeners, and many private individuals, raise seed for their own use. Some of the handsomest cabbages of the different sorts are dug up in autumn, and sunk in the ground to the head; early next summer a flower-stem appears, which is followed by abundance of seed. A few of the soundest and healthiest cabbage-stalks, furnished with sprouts, answer the same end. When the seed has been well ripened and dried, it will keep for six or eight years. It is mentioned by Bastien, that the seed-growers of Aubervilliers have learned by experience, that seed gathered from the middle flower-stem produces plants which will be fit for use a fortnight earlier than those from the seed of the lateral flower-stem; this may deserve the attention of the watchful gardener, and assist him in regulating his successive crops of the same kind of cabbage."—*Loudon.*

Field culture.—The variety cultivated in the fields for cattle is almost exclusively the large Scotch, or field cabbage. The land is prepared the same way as for other hoed crops. "The preparation given to the plants," says Loudon, "consists in pinching off the extremity of their tap-root, and any tubercles which appear on the root or stem, and in immersing the root and stem in a puddle or mixture of earth and water, to protect the fibers and pores of the roots and stem from drought. The plants may then be inserted by the dibbler, taking care not to plant too deep, and to press the earth firmly to the lower extremity of the root. If this last point is not attended to, the plants will either die, or, if kept alive by the moisture of the soil, or rain, their progress will be very slow. When the distance between the ridglets [or rows] is twenty-seven inches, the plants are set about two feet asunder in the rows, and the quantity required for an acre is about 6000 plants." The after-culture, preservation, uses, &c. have been sufficiently detailed in the preceding pages, under this head.

CARAWAY.

Carum carui.

"The caraway is a biennial plant, a native of England, being occasionally found in meadows and pastures. It rises a foot and a half high, with spreading branches; the leaves are decompound; the leaflets in sixes; it produces umbels of white flowers in June.

"*Use.*—The plant is cultivated chiefly for the seed, which is used in confectionery and in medicine. In spring, the under leaves are sometimes put in soups; and in former times the fusiform roots were eaten as parsnips, to which Parkinson gives them the preference. In Essex, large quantities of the seed are annually raised for distillation with spirituous liquors.

"*Culture.*—It is raised from seed, of which a quarter of an ounce is sufficient for a seed-bed four feet by five. Sow annually, in autumn, soon after the seed is ripe: the seedlings will rise quickly, and should be thinned to a foot's distance each way. In default of sowing in autumn, sow in March or April, either in drills or broad-cast; but the plants, so raised, will not in general flower till the following year. When the seed is ripe, the plant is generally pulled up in gathering, especially in *field culture.*"—*Loudon.*

CARDOON.

Cynara cardunculus.—*Cardon*, Fr.—*Kardonen*, Ger.

The cardoon is a hardy, perennial plant, a native of Candia, introduced into England in 1658. It is a species of artichoke, and grows wild in the south of France.

Propagation.—"Though a perennial, it often dies in the winter, and therefore requires to be raised from seed almost every year; and, for a bed four feet wide by eight feet, two ounces are sufficient. Formerly the plants were raised on hot-beds, and transplanted in May and June, but now the seed is generally sown where the plants are to remain."—*Loudon.*

Use.—"The parts of the cardoon that are eaten are not those belonging immediately to the flower, as of the artichoke, but the roots, stalks, and middle ribs of the leaves, and chiefly the latter, which are thick and crisp.

But as all these are naturally bitter, the plants are blanched by being tied up like lettuces, about the month of September, and having earth thrown upon their lower parts to the depth of eighteen inches or two feet. Cardoons come into season about the end of November; and are either eaten alone, or as a sauce to animal food, particularly roast meat; or are introduced as a dish in *the second course*." -*Loudon.*

CARROT.

Daucus Carota.—*Carotte*, Fr.—*Mohre*, Ger.

This plant is said to be a native of Great Britain, where it is still found growing wild. There are many varieties of the carrot; and the following are the finest sorts enumerated in Mr. Russell's Catalogue:—

Altringham, (a superior sort,)
Early horn,
Cremer, (fine for the table,)
Lemon,
Long orange,
Blood red.

Soil.—" The carrot requires a light, mellow soil, mixed with sand, and should be dug or trenched one or two spades deep, breaking well all the lumpy parts, so as to form a porous bed, and an even surface. The orange and red sorts, on account of their longer roots, require a soil proportionably deeper than the horn."

Seed estimate and sowing.—The seeds have numerous forked hairs on their borders, by which they adhere together, and therefore should, previously to sowing, be rubbed between the hands, and mixed with dry sand, in order to separate them as much as possible. They are also very light, and therefore a calm day must be chosen for sowing; and the seeds should be disseminated equally and trodden in before raking. Previously to sowing, if convenient, the seed should be proven, by sowing a few in a pot, and placing it in a hot-bed or hot-house, as it is more frequently bad than most seeds. For a bed 4½ feet by 30, one ounce will be requisite, and the same for 150 feet of drill row. Dr. Deane advises to sow carrots in drills from 9 to 12 inches apart, across beds 4 feet wide. M'Mahon directs to sow thin in drills, distant from each other from 8 to 10 inches, and to thin them to 3 inches, plant from plant, in the rows.

To save seed.—Plant some largest, best roots early in the spring, two feet apart; insert them a few inches over the crowns. They will yield ripe seed in autumn, of which gather only from the principal umbel, which is likely not only to afford the ripest and largest seed, but the most vigorous plants.

Field culture.—"The only sort of carrot adapted to field culture," says Loudon, "is the long red, or field carrot. New seed is most essential, as it will not vegetate the second year. The best soil for the carrot is a deep, rich, sandy loam; such a soil ought to be at least a foot deep, and all equally good from top to bottom. On any other the field culture of the carrot will not answer.

"The usual preparation of the seed for sowing is the mixing it with earth or sand, to cause it to separate more freely; but Burrows adds water, turns over the mixture of seeds and moist earth several times, and thus brings it to the point of vegetating before he sows it. Having weighed the quantity of seed to be sown, and collected sand or fine mould, in the proportion of about two bushels to an acre, I mix the seed with the sand or mould, eight or ten pounds to every two bushels, and this is done about a fortnight or three weeks before the time I intend sowing; taking care to have the heaps turned over every day, sprinkling the outside of them with water each time of turning over, that every part of the sand heaps may be equally moist, and that vegetation may take place alike throughout. I have great advantage in preparing the seed so long before hand; it is by this means in a state of forward vegetation, therefore lies but a short time in the ground, and, by quickly appearing above ground, is more able to contend with those numerous tribes of weeds in the soil, whose seeds are of quicker vegetation."

The quantity of seed, when carrots are sown in rows, is two pounds per acre; and, for broad-cast sowing, five pounds. The rows for the larger or proper field carrots, should be from 14 to 16 or 18 inches apart; and the carrots thinned, in hoeing, to 3 or 4 inches apart in the rows. The seeds will do best when sown by hand, as their shape does not well admit of their being sown by machines. Loudon says, "It has been advised, by an intelligent cultivator, to deposit the seed to the depth of one inch in the rows, leaving the spaces of fourteen inches between them as intervals; the seed in these cases, being previously steeped in rain water for twenty-four hours, and left to sprout, after which it is mixed with saw-dust and dry mould, in the proportion of one peck and a half of each to a pound of seed. The land is afterwards lightly harrowed over once in a place. Two pounds of seed, in this mode, is found, as has been observed, sufficient for an acre of land."

After-culture.—The first hoeing of carrots must be by hand—an operation which requires a great deal of attention, as it is difficult to distinguish and separate the weeds from the young carrots. Loudon says, "From eight to fifteen or eighteen inches, each way, is the common distance at which they are allowed to stand; and it has been proved, from many years' experience in districts where they are most cultivated, that carrots which grow at such distances always prove a more abundant crop than when the plants are allowed to stand closer together." Deane observed, "It is not amiss if they grow large and rank, when they are chiefly designed as food for cattle, though small-sized ones are preferred for the table."

Mr. Quincy gives the following statement of the mode of cultivating carrots, made use of by Samuel Wyllys Pomeroy, and which he prefers to all others:—

"Plow as deep in the fall or spring as the state of the land will permit. Cross-plow in the spring, and harrow level. Put on fifteen, twenty, or twenty-five buck-loads of the most rotten compost to the acre, as the heart of the land may be. Spread and harrow it fine. Then, with a horse-plow, strike it into two-bout ridges, as near together as four back furrows will make them, and if the two first back furrows are narrow, the other two being deep, the ridge will be nearly to a point, and should be eighteen or twenty inches from the bottom of the furrow, if it be well cleared out. To do which, make another bout in the furrow, if necessary. Then, with the head of the rake, strike off the crown of the ridge, till it is three or four inches wide, and with it, or a hoe, open a drill in the usual manner. Sow the seed pretty thick, cover and press down a little with a hoe or shovel. When the weeds appear, run a small plow through the furrows. Hand-weed the crop, and hoe the weeds from the sides of the ridge. The orange carrot is best."

"In harvesting, a plow with one yoke of oxen should be run near the side of the range of carrots, and as deep as possible. This loosens the dirt, and clears one side of the carrots almost entirely from the earth. The laborers then, with great facility, take them by their tops out of the beds, and throw them into carts, with only an occasional use of the hoe to plants which the plow has not loosened.

"I have no question that, conducted in this mode, a carrot crop may be made more productive, and much less expensive, than the potato crop usually is. In sowing, I use a small hand-drill, which lays the seed with great regularity—a circumstance very important both to facilitate weeding and harvesting; since, if the carrots stand straggling, and not in a line, the plow, when harvesting, leaves the more to be loosened by the hoe or the fork."—*Massachusetts Agricultural Repository*, vol. iv, p. 24.

A mode of cultivating carrots, differing slightly from the above, is described by Mr. Quincy, in the same work, vol. iv, p. 212.

For other modes of cultivating this root, see *Mass. Agr. Rep.* vol. v, pp. 20, 255, 347.

Use.—"Horses are remarkably fond of carrots, and it is even said, that when oats and carrots are given together, the horses leave the oats and eat the carrots. The ordinary allowance is about forty to fifty pounds a day to each horse. Carrots, when mixed with chaff, that is, cut straw, and a little hay, without corn, keep horses in excellent condition for performing all kinds of ordinary labor.

"In comparing the carrot with the potato, an additional circumstance greatly in favor of the former is, that it does not require to be steamed or boiled, and it is not more difficult to wash than the potato. These and other circumstances considered, it appears to be the most valuable of all roots for working horses.

"The use of the carrot in domestic economy is well known. Their produce of nutritive matter, as ascertained by Sir H. Davy, is ninety-eight parts in one thousand; of which three are starch, and ninety-five sugar. They are used in the dairy in winter and spring to give color and flavor to butter. In the distillery, owing to the great proportion of sugar in their composition, they yield more spirit than the potato; the usual quantity is twelve gallons per ton. They are excellent in soups, stews, and haricots, and boiled whole with salt beef.

"The diseases of carrots are only such as are common to most plants, such as mildew, insects, &c. The mildew and worms at the root frequently injure crops, and are to be guarded against, as far as practicable, by a proper choice, soil, season of sowing, and after-culture."—*Loudon.*

CAULIFLOWER.

Brassica Oleracea.—*Chou-fleur*, Fr.—*Blumenkohl*, Ger.

The cauliflower is one of the most delicate and curious of the whole of the *brassica* tribe; the flower buds forming a close, firm cluster or head, white and delicate, for the sake of which the plant is cultivated.

Varieties.—Early (*for the first, early crops*).—Later, or large (*for principal crops*).

"*Propagation and Soil.*—The cauliflower is raised from seed, of which half an ounce is sufficient for a seed-bed four feet and a half wide, by ten in length. The soil for the seed-bed may be light, but, for final transplanting, it can hardly be too rich, the cauliflower, like the vine, being reputed a 'rough feeder.' Cleanings of streets, cesspools, &c., ought, therefore, to be liberally supplied during the growth of the plants, when very large heads are desired.

"*Times of sowing.*—The early and main superior crop, brought to fruit by the longest nursery attendance; the late summer succession crop, raised by the shortest course; and the Michaelmas (29th of Sept.) crop, obtained at the least expense, are sown, respectively, at three different seasons. The principal sowing is made about the end of the third week in August, or a day or two before or after the 21st, to raise plants to stand over winter, under frames, hand-glasses, or half-sheltered warm borders, for the early and main superior crops next summer. A secondary sowing in February or March, for succession, and late inferior crops the same year in summer and autumn. A final sowing, near the close of May, for ordinary crops, to yield fruit the following autumn and winter. The seedlings, protected with glass frames, generally grow too gross in the stems, which become partly blackened, and the plants, being thus unhealthy, are not fit for planting out. Late-raised seedlings, which spend the winter in the open border, uniformly become the large and finest table cauliflowers during the summer, though they certainly do not come in quite so early. Cauliflower plants, it is probable, are often killed with too much attention. Seedlings raised late in autumn seem to be very tenacious of life."—*Caled. Hort. Mem.* iii, 192. "A method of producing cauliflowers pretty early, and with great certainty, is this:—The plants are set in small pots in the winter season, and kept in any convenient part of the floor of a vinery or other glazed house. In the beginning of March they are taken out of the pots with the ball of earth attached, and planted in the open ground. If they be here protected against severe frosts with bell-glass covers, they come into head in the course of April, if the weather prove favorable."—*Neill, in Edin. Encyc.*

Drummond, of the Cork botanic garden, protects cauliflower plants during winter by planting them in excavations made in the common soil of the garden, and covered with frames thatched with long, straight wheat straw. He uncovers constantly in mild weather, whether nights or days.—*Hort. Trans.* v, 369.

For after-culture, preservation through winter, saving seed, &c., proceed as with the common white cabbage.

Use.—"Among the succulent plants produced in our climate, this doubtless is one of the most nourishing, and likewise the best adapted to tender organs of digestion, especially in valetudinarians and invalids; such persons however, ought to eat it with the addition of some aromatic spice, such as pounded cardamoma, or caraway, or a small proportion of bread. To make the cauliflower blanch handsomely, the gardeners tie over the heads of the plant.

"*To prepare cauliflowers.*—Let the cauliflowers first be parboiled; next they must be immersed in cold, hard water for some time, till they be nearly wanted for the table; thus, on being boiled for a few minutes, they will become more firm and crisp than if cooked in the usual manner."—*Dom. Encyc.*

Neill (in *Edinburgh Encyc.*) observes, "These heads or flowers being boiled, generally wrapped in a clean linen cloth, are served up as a most delicate vegetable dish. Cauliflower is a particular favorite in this country. 'Of all the flowers in the garden,' Dr. Johnson used to say, 'I like the cauliflower.' For the early supply of the London market, very great quantities of cauliflower are fostered under hand-glasses during winter and the first part of spring; and to behold some acres overspread with such glasses, gives the stranger a forcible idea of the riches and luxury of the metropolis."

CELERY.

Apium Graveolens.—*Celeri*, Fr.—*Sellerie*, Ger.

Celery is a hardy biennial plant, a native of Great Britain, and, when in its wild state, it is denominated *smallage.* The root, in its wild state, is thick and fibrous. The stalk is bushy and furrowed, and attains the height of two or three feet. The leaves are wedge-shaped, and the flowers yellow, which are produced in August. The varieties usually cultivated are, the

White solid,
Rose-colored solid,
Italian, and
Celeriac, or turnip-rooted.

Propagation.—All the sorts are raised from seed; and half an ounce is reckoned sufficient for a seed-bed four feet and a half wide by ten feet in length, of the upright sorts; but for celeriac, a quarter of an ounce will be enough for a bed four feet square.

Soil.—Celery delights in a soil rather moist, rich in vegetable mould, but not rank from new, unrotted dung.

Times of sowing.—"The most forward crop is slightly forced; any of the varieties may be sown in the spring, in the open garden, at two or three different times, from the 21st of March till the first week in May; but the principal sowing should be made in the first fortnight in April. Sow in beds of light mellow earth, and rake in the seed lightly and regularly. In very dry weather, give moderate watering both before and after the plants come up. When they are two, three, or four inches high, thin the seed-bed, and prick out a quantity, at successive times, into intermediate beds, three or four inches asunder. Water those removed until they have struck" [*taken root*].—*Loudon.*

Transplanting into trenches.—"When either the plants left in the seed-bed, or those removed, are from six to twelve inches high, or when the latter have acquired a stocky growth, by four or five weeks' nurture in the intermediate bed, transplant them into trenches for blanching. For this purpose, allot an open compartment. Mark out the trenches a foot wide, and from three to three and a half distance; dig out each trench lengthwise, ten or twelve inches in width, and a light spit deep, that is, six or eight inches. Lay the earth dug out equally on each side of the trench; put about three inches of very rotten dung into the trench, then pare the sides, and dig the dung and parings with an inch or two of the loose mould at the bottom. Trim the tops and roots of the plants, and then set them in single rows along the middle of each trench, allowing four or five inches distance from plant to plant. When this work is finished, give the plants water in plenty and occasionally water them from time to time, if the weather be dry, and likewise let them be shaded, till they strike root and begin to grow. When they have grown to the height of eight or ten inches, draw earth to each side of them, breaking it fine. This should be done in dry weather, being careful not to bury the hearts. Repeat the earthing once in ten days, till the plants are fit for use. Be careful, however, not to draw up too much earth to the plants at first, lest they be smothered, and leave the plants in a little hollow, that they may receive the full benefit of the waterings rain, &c."

Taking the crop.—It is best to begin at one end of a row, and dig clean down to the roots, which then loosen with a spade, and they may be drawn up entire, without breaking the stalks.

To preserve this plant during the winter, on the approach of frost take up a part of the crop, and lay it under sand for winter use. Those left in the beds may be covered with litter, to be removed in mild weather. Cobbett directs, to preserve celery in beds as follows:—" Two boards, a foot wide each, their edges on one side laid upon the earth of the ridge, formed into a *roof* over the point of the ridge, the upper edge of one board going an inch over the upper edge of the other, and the boards fastened well with pegs, will do the business completely; for it is not the frost, but the occasional *thaws*, that you have to fear, and the *wet* and *rot* that they produce."

To save seed.—Either leave some established plants in the spring where growing, or in March, as soon as the frost will permit, set the plants in the ground, full two feet asunder.

Cultivation of celeriac.—The times of sowing are the same as for the other sorts. In the beginning or middle of June, they are transplanted into a flat bed in the open air, at the distance of fifteen inches from each other, and not in trenches, like other celery. They must be abundantly watered as soon as they are set out, and the watering must be repeated every other day, or, if the weather should be warm, every day. As they increase in size, they will require a greater quantity of water, and they must be occasionally hoed. The roots will be fit for use in September or October. Sabine states, that he has been informed that the plan of giving excess of water is peculiar to this plant, and that its vigorous growth is more dependent on richness of soil than any other cause. Abercrombie directs to earth up the bulbs four or five inches, after they are full grown, in order to blanch them.

" *Use.*—The blanched leafed-stalks are used raw, as a salad, from August till March; they are also stewed, and put in soups. In Italy, the unblanched leaves are used for soups, and when neither the blanched nor the green leaves can be had, the seeds bruised form a good substitute. The root only of the variety called the celeriac is used, and Sabine informs us (*Hort. Trans* vol. iii), 'it is excellent in soups, in which, whether white or brown, slices of it are used as ingredients, and readily impart their flavor. With the Germans, it is also a common salad, for which the roots are prepared by boiling, until a fork will pass easily through them: after they are boiled, and become cold, they are eaten with oil and vinegar. They are also sometimes served up at table, stewed with rich sauces. In all cases, before they are boiled, the coat and fibers of the roots, which are very strong, are cut away; and the root is put into cold water, on the fire, not in water previously boiling.'" *Loudon.*

CHAMOMILE.

Anthemis nobilis.

Varieties.—These are the common single and double-flowered.

Soil and culture.—This herb delights in a poor, sandy soil. "Both kinds are propagated by parting the roots, or by slips of the rooted offsets or of the runners. Detach them with roots in little tufty sets in March, April or May, and plant them from eight to twelve inches asunder, giving water. The flowers should be gathered in their prime, in June or July, just when full-blown. Let them be spread to dry in a shady place; then put them into paper bags, and house them for use."—*Abercrombie.*

"*Use.*—It is cultivated on account of the flower, which is a safe bitter and stomachic, and much used under the name of chamomile-tea. The double-flowering variety, though more beautiful than the single-flowered, is less useful; the aromatic principle not residing in the floscules of the ray, the multiplication of which constitutes the double flower. The double sort, however, is most cultivated by growers.

CHIVE.

Allium schœnoprasum.—*Civette*, Fr.—*Binsenlauch*, Ger.

"The *chive*, or *cive*, is a hardy perennial plant, a native of Britain, and found in meadows and pastures, though but rarely. The leaves rise from many small bulbous roots connected in bunches; are awl-shaped, thread-like, and produced in tufts. The flowers are white, tinged with reddish-purple, and appear on round stalks in June."—*Loudon.* It is of common and easy cultivation.

CORIANDER.

Coriandrum sativum.

Coriander is a hardy annual plant, which originated in the East

Culture.—This plant delights in a sandy loam. It is raised from seeds, which may be sown in March, or as soon as the frost will permit, when the weather is mild and dry. The quantity of seed requisite for a bed six feet long and four feet wide, sown in rows nine inches apart, is half an ounce. The seed should be buried half an inch.

Use.—The seeds have a pleasant flavor, and, when incrusted with sugar, are sold by the confectioners under the name of *coriander comfits.* They are also used in the bitter infusions and preparations of senna, the disagreeable taste of which they completely overcome, and for various other purposes, both by druggists and distillers.

CRESS, WATER.

Sisymbrium nasturtium.

A genus of plants, of which the principal is the common water-cress, found in springs and brooks. It is perennial, and produces white flowers that are in bloom in June or July. Lasteyrie tells us, that in Germany, great pains are taken to propagate the water-cress, and gives the following account of their mode of doing it: "The water," he says, "most favorable for its production, is that in which it grows naturally, and which in winter preserves heat enough to prevent it from freezing. The situation on which to form a cress plantation ought to have a little slope or inclination, because water in a state of repose, alters the flavor of the plant. Having chosen the place, it is formed into heights and hollows alternately; the latter are destined for the cresses, and the former for the culture of other plants. The size of the hollows is made to depend on the quantity of water you can bring into them, and the demand for the article to be raised. If the soil of the hollows is not sufficiently rich, better earth must be brought to amend it, and if the bottom be marshy, you throw over it some inches of sand. Your next step is to cover it with water for some hours, after which you drain and sow or plant. At the end of a few days, you let in the water, and drain as before, and continue these processes until the cresses appear, if sown, or until they have taken root, if planted. The quantity of water let in is always to be regulated by the growth of the plant; for though it cannot live but in water, it will not bear to be long covered with it. Planting is always surer than sowing, and is therefore preferred. The epoch for this is either March or August. The distance between the plants should not be less than ten or fifteen inches. Moving the earth about their roots with the hoe, from time to time, is useful; but for the rest, (having once taken root,) no further care is necessary. A cress plantation is in full bearing the second year, and lasts a long time. When it begins to fail, it may be renewed by taking off a foot of the surface soil of the old beds and replacing it with good and fresh earth. In winter, the beds are covered more deeply with water, which protects the plant against the frost."

The same writer informs us how they manage their cress plantations near Paris. "Having there," he says, "no running water, they cultivate it in the neighborhood of wells, and water it every day. The cress vegetates promptly, but becomes acrid in taste. They accordingly prefer sowing to planting, because if cut when only six inches high, and treated in all respects as an annual, it has least of this pungency."—*Armstrong's Treatise.*

Loudon says, "Some market gardeners, who can command a small stream of water, grow the water-cress in beds sunk about a foot in a retentive soil, with a very gentle slope from one end to the other. Along the bottom of this bed, which may be of any convenient breadth and length, chalk or gravel is deposited, and plants are inserted about six inches' distance every way. Then, according to the slope and length of the bed, dams are made six inches high across it, at intervals; so that, when these dams are full, the water may rise not less than three inches on all the plants included in each. The water being turned on will circulate from dam to dam; and the plants, if not allowed to run to flower, will afford abundance of young tops in all but the winter months. A stream of water, no larger than what will fill a pipe of one inch bore, will, if not absorbed by the soil, suffice to irrigate in this way an eighth of an acre. As some of the plants are apt to rot off in winter, the plantation should be laid dry two or three times a year, and all weeds and decayed parts removed, and vacancies filled up. Cress grown in this way, however, is far inferior to that grown in a living stream flowing over gravel or chalk."

Use.—"Water-cresses are universally used and eaten as an early and wholesome spring salad. Being an excellent anti-scorbutic and stomachic, they are nearly allied to scurvy grass, but do not possess so great a degree of acrimony. They are also supposed to purify the blood and humors, and to open visceral obstructions."—*Dom. Encyc.*

CRESS, GARDEN.

Lepidium sativum.—*Cresson*, Fr.—*Kresse*, Ger.

The garden-cress is a hardy annual plant, cultivated, says Loudon, since 1584; but its native country is unknown.

Varieties.—

Curled, or peppergrass.	Broad-leaved garden cress.

This plant is raised from seed, of which one ounce will suffice for a bed of four feet square.

Times of sowing, and site of the crop.—Cress should be raised three or four times every month, as it may be in demand, to have young crops constantly in succession. Allot some warm situation for early spring sowing; and, if the weather be cold, either put on a spare frame, or cover with matting between sunset and sunrise. For autumnal sowings, when cold weather is approaching, allot some warm borders, and give occasional protection. "The cress," says Loudon, "is often raised on porous earthenware vessels, of a conical form, having small gutters on the sides for retaining the seeds. These are called *pyramids*, are somewhat ornamental in winter, and afford repeated gatherings."

Process in sowing, and subsequent culture.—"Having allotted a fine, mellow soil, to receive the seed, dig the surface, and rake it finally, preparatory to sowing, which mostly perform in small, flat, shallow drills, four, five, or six inches asunder. Sow the seed very thickly, and earth over very lightly, or but just thinly cover. Give occasional waterings in warm, dry seasons."

Taking the crop.—"To gather cress in perfection, cut them while quite young, either clean to the root, or only the tops of advanced plants. They will shoot again for future gathering, but the leaves will be hotter, and not so mild and tender as those of younger plants."

To save seed.—"Either sow a portion in the spring for that purpose or leave some rows of any overgrown old crop in April or May. The plants will yield seed in autumn."

CUCUMBER.

Cucumis sativa.—Concombre, Fr.—*Gurke*, Ger.

Among the varieties of this species of plants, are

- Early Green Cluster,
- Early frame,
- Long green Turkey,
- Long white Turkey,
- Long prickly,
- White spined,
- Short prickly,
- Small girkin, or West India.

Soil.—In our climate, cucumbers will grow in any soil, though not with the same degree of vigor, provided they be supplied with a sufficiency of heat, light, water, and air. It is an object with many market gardeners and others, to produce cucumbers at an early period, and for this purpose artificial heat is necessary. For early forcing, Abercrombie recommends a mould or compost, of the following materials: "one third of rich top spit earth, from an upland pasture, one half of vegetable mould, and one sixth of well decomposed horse-dung, with a small quantity of sand.

Time of beginning to force.—Abercrombie says, "Managers, who have to provide against demands for early cucumbers, must raise seedlings from twelve to ten weeks before the fruit will be required, according to the length of the days in the interval. In proportion as the entire course embraces a greater part of mid winter, the liability of failure from obstacles in the weather will be greater. The last fortnight in January, or first week of February, is a good time for beginning to force the most early crop. In the subsequent months, both main and secondary crops may be started as required and will come forward more freely. To have a constant succession, seedlings should be originated twice a month. As the course of forcing more coincides with the natural growing season, the length of it will be reduced to eight, seven, or six weeks." Nicol recommends the middle of January. He says, "Some begin sooner, but it is striving hard against the stream to little purpose. If the dung be prepared, and the bed be got ready, so as to sow about the 1st of February, the success will be often greater than by sowing a month earlier." Besides, cucumbers, produced altogether by the heat of dung, without the aid of the sun, are less wholesome and palatable than those which Nature affords in the due course of her operations.

Sorts.—Abercrombie recommends "the short prickly for very early fruit, and the long prickly kinds for the chief early and main summer crops." M'Phail prefers "the green cucumber with black prickles, as best for forcing. When fit for table, it runs from six to nine inches long, and, when ripe, runs to about eighteen or twenty inches long."

Choice of seeds.—"It is advisable," Abercrombie observes, "to have seed from two, at least, to four years old, in preference to newer seed, which is apt to run luxuriantly in vine, and the plants from it do not show fruit so soon nor so abundantly as those from seed of a greater age. But when seed has been kept more than four years, it is sometimes found to be too much weakened." Mr. Armstrong says, "A debate has long existed, on the preference to be given to *old* or *new* seeds, and which, like many others, appears to be interminable. The Abbé Rozier and his followers think that the most vigorous plants of all species and kinds are the best, and, accordingly, prefer new seeds, because more likely to produce such than old ones: while, on the other hand, their opponents maintain, that plants may have too much vigor, as well as too little; and that, whenever an excess of vigor exists, according to all vegetable analogy, it shows itself in the production of stems and leaves, not in that of flowers and fruits—whence they conclude, that old cucumber seeds, (like those of all the rest of the *cucurbitaceæ* family,) are better than new, because *less vigorous*. The best practical use to be made of this controversy is to sow *old* seeds in the *spring*, when vegetation is most powerful, and *new* ones in *July* when it begins to abate."

Forcing cucumbers.—"Towards the latter end of January, a quantity of fresh horse dung should be procured with the litter among it, to which a small portion of sea-coal ashes may well be added. In the course of four or five days, the dung begins to heat, when a little of it may be drawn flat on the outside, and covered two inches thick with good earth; over which a bell glass ought to be placed; and two days after, when the soil is warm, the seeds should be sown, covered with fresh mould one-fourth of an inch thick, and the glass again set over it. This must be screened by a mat during the night, and in four days the young plants will germinate. As soon as they appear, the rest of the dung must be beaten close together into a bed for one or two more lights, which bed should be three feet thick, and covered three inches deep with fine, fresh earth; the frame is then to be put on; and during the night, or in bad weather, sheltered with mats. When the soil is hot enough, the young plants must be removed into it, and set at two inches distance, the glasses being occasionally raised to admit fresh air, and also frequently turned, to prevent the wet steam of the dung from dropping down on the plants. These ought to be watered at stated times, with tepid or luke-warm water; and, as they increase in size, should be earthed up; an operation which will considerably augment their strength. If the bed be not hot enough, fresh litter should be laid round its sides; but if it be too warm, it should be perforated with a stake to give vent to the heat; and, as soon as the bed acquires a proper temperature, the holes are to be closed up with fresh earth. When the plants begin to shoot their third or rough leaf, another bed should be prepared for them, similar to the first; and, when the soil is thoroughly warmed, they should be transplanted into it, in holes about a foot deep, and nine inches broad, filled with light, fine, fresh mould, laid in a hollow, circular form. In each of these holes four plants should be set, and shaded for two or three days from the heat of the sun, that they may strike root; after which time it will be useful to expose them to the sun and air, as often as the weather will permit. When they have attained the height of four or five inches, they should be gently fastened down to the soil, in different directions; and the branches afterwards produced ought to be treated in a similar manner, as it will much contribute to forward their maturity. In the course of a month the flowers will appear, and, shortly after, the rudiments of the fruit. The glasses should now be carefully covered during the night, and the plants gently sprinkled with water in the day time. These will produce fruit till midsummer, and may be succeeded by a second crop, which is to be raised nearly in the same manner as the earlier cucumbers, with this only difference, that the former should be sown toward the end of March, or the beginning of April, and that it requires less care and attention."—*Dom. Encyc.*

The smallest degree of heat for forcing cucumber plants, at the coldest time of night, is 58 degrees; and the greatest heat necessary in the day time is 65 degrees.

"Well preparing the dung is of the greatest importance in forcing the cucumber, and if not done before it is made into a bed, it cannot be done after, as it requires turning and watering to cause it to ferment freely and sweetly; fresh dung from the stable will require at least six weeks' preparation before it will be fit to receive the plants. A month before it is made into a bed, it should be laid into a heap, turned three times, and well shaken to pieces with a fork, and the outsides of the heap turned into the middle, and the middle to the outsides, that the whole may have a regular fermentation; and if any appear dry, it should be made wet, keeping it always between the two extremes of wet and dry. A dry spot of ground should be chosen to prepare the dung on, that the water may drain away from the bottom of the heap. The dung having been a month in heap, I make the bed as follows:—I form a stratum one foot high, of wood of any kind, but if large the better; (old roots of trees, or any other of little value will do;) this is to drain the water from the bottom of the bed; for, after a month's preparation, with every care, it will frequently heat itself dry, and require water in large quantities, which, if not allowed to pass off freely, will cause an unwholesome steam to rise, in which the cucumber-plant will not grow freely: on this bottom of wood I make the bed, four feet high, with dung, gently beating it down with a fork: this is done about the 1st November, and by the month of February the four feet of dung will not be more than two feet thick, which, with the foot of wood at the bottom, will make the bed three feet high; this I consider a good height, for, if lower, it cannot be so well heated by linings, which is the only method of warming it in the months of February and March, as by that time the first heat of the bed will have quite declined. Having made the bed, I put on the frames and lights, which I shut close till the heat rises

I then give air night and day, sufficient to allow the steam to pass off, and once in two days I fork the surface over, about nine inches deep, to sweeten it, and if, in the operation, I find any part dry, I carefully wet it. The bed being quite sweet, I prepare it for the mould, by making the middle about eight inches lower than the sides, as the sides are liable, from the weight of the frames, to settle faster than the middle, which often causes the hills of earth to crack, by which the roots of the plants are greatly injured."—*Hort. Trans.* vol. iii, p. 147.

Mr. Cobbett says, "If you wish to have cucumbers a *month earlier* than the natural ground will bring them, do this:—Make a hole, and put into it a little hot dung; let the hole be under a warm fence. Put six inches deep of fine rich earth on the dung. Sow a parcel of seeds in this earth; and cover at night with a bit of carpet, or sail-cloth, having first fixed some hoops over this little bed. Before the plants show the *rough* leaf, plant two into a little flower-pot, and fill as many pots in this way as you please. Have a larger bed ready to put the pots into, and covered with earth, so that the pots may be plunged in the earth up to their tops. Cover this bed like the last. When the plants have got two rough leaves out, they will begin to make a *shoot* in the middle. Pinch that short off. Let them stand in this bed. till your cucumbers *sown in the natural ground come up;* then make some little holes in good, rich land, and, taking a pot at a time, turn out the *ball*, and fix it in the hole. These plants will bear a *month sooner* than those sown in the natural ground; and a *square yard* will contain thirty-six pots, and will, of course, furnish plants for thirty-six hills of cucumbers, which, if well managed, will keep on bearing till September. Those who have *hot-bed frames*, or *hand-lights*, will do this matter very easily. The cucumber plant is very tender and juicy; and, therefore, when the seedlings are put into the pots, they should be *watered* and *shaded* for a day or two; when the balls are turned into the ground, they should be *watered*, and shaded with a bough for one day. That will be enough.—I have one observation to make upon the cultivation of cucumbers, melons of all sorts, and that of all the pumpkin and squash tribe; and that is, that it is a great error to sow them *too thick*. One plant in a hill is enough; and I would put *two into a pot*, merely as a bar against accidents. One will bring more weight of fruit than two, (if standing near each other,) two more than three, and so on, till you come to fifty in a square foot; and then you will have no fruit at all! Let any one make the experiment, and he will find this observation mathematically true. When cucumbers are left eight or ten plants in a hill, they never shoot *strongly*. Their vines are poor and weak. The leaves become yellow; and, if they bear at all, it is poor, tasteless fruit that they produce. Their bearing is over in a few weeks. Whereas, a single plant, in the same space, will send its fine green vines all around it to a great distance, and, if no fruit be left to *ripen*, will keep bearing till the white frosts come in the fall.—The roots of a cucumber will go ten feet, in fine earth, in every direction. Judge then, how ten plants, standing close to one another, must produce mutual starvation!"

Mr. Armstrong has the following observations with regard to *early* cucumbers: "To obtain these, we must have recourse to artificial heat; and with the less reluctance, as, of all plants, the cucumber is that with which it best agrees. To this end, therefore, scoop as many large turnips as you propose to have *hills;* fill these with good garden mould, sow in each three or four seeds, and plunge them into a hot-bed. The advantage of the scooped turnip, as a seed-bed, over pots or vases, will now appear; for, instead of the ordinary difficulty of separating the mass of earth and the plant from the pot that contained them, and without injury to either, we re-enter both pot and plant, and even find in the one an additional nutriment for the other. The subsequent treatment does not differ at all from that of plants sown and cultivated in the open air."—*Mem. of N. Y. Board of Agr.* vol. ii, p. 115.

Training.—To force the cucumbers into early fruit, Abercrombie directs to "stop the runners as soon as the plants have made two rough leaves: as the bud that produces the runner is disclosed at the base of the second rough leaf, it may be cut off or picked out; or, if the runner has already started, it may be pinched off close. This is called stopping at the first joint, and is necessary to promote a stronger, stocky growth, and an emission of fruitful laterals; and from these the prolific runners will be successively produced. The vines, without the process of stopping, would generally be both weaker, and so deficient in fertile runners, that they would sometimes extend two or three feet without showing fruit. When plants, which have been once stopped, have extended the first runners to three joints without showing fruit, they are to be again stopped for the purpose of strengthening the plant, and disposing it for bearing. As fertile runners extend, train them out regularly along the surface, fastening them down neatly with pegs."

Upright training.—Cucumber plants being climbers by means of their tendrils, some branchy sticks being placed to any advancing runners, they will ascend, and produce fruit at a distance from the ground, of a clean growth, free from spots, and well flavored. "Mr. J. W. of Philadelphia informed Dr. Mease, that he enriched the ground near the trunk of a peach tree, and sowed some cucumber seed, which came up very abundantly. He pulled up all the plants but one, and permitted the vine to run up the tree. It bore 150 cucumbers. The numerous creepers with which the cucumber abounds, and the result of this experiment, would seem to point out the climbing nature of the plant, and the great advantage arising from permitting it to attach itself to a frame or tree, instead of confining it to the ground."—*Dom. Encyc.*

Setting the fruit.—"The cucumber," Abercrombie observes, "bears male and female blossoms distinctly on the same plant. The latter only produce the fruit, which appears first in miniature, close under the base, even before the flower expands. There is never any in the males; but these are placed in the vicinity of the females, and are absolutely necessary, by the dispersion of their farina, to impregnate the female blossom; the fruit of which will not otherwise swell to its full size, and the seeds will be abortive. The early plants under glass, not having the full current of the natural air, nor the assistance of bees and other winged insects to convey the farina, the artificial aid of the cultivator is necessary to effect the impregnation. At the time of fructification, watch the plants daily; and as soon as a female flower and some male blossoms are fully expanded, proceed to set the fruit the same day, or next morning at furthest. Take off a male blossom, detaching it with part of the footstalk. Hold this between the finger and thumb; pull away the flower-leaf close to the stamens and anthera or central part, which apply close to the stigma or bosom of the female flower twirling it a little about, to discharge thereon some particles of the fertilizing powder. Proceed thus to set every fruit, as the flowers of both sorts open, while of a lively, full expansion; and generally perform it in the early part of the day; using a fresh male, if possible, for each impregnation, as the males are usually more abundant than the female blossoms In consequence, the young fruit will soon be observed to swell freely. Cucumbers attain the proper size for gathering in about fifteen, eighteen, or twenty days from the time of setting; and often in succession, for two or three months or more, in the same bed, by good culture. The above artificial operation will be found both necessary and effectual in forcing the cucumber, between the decline of autumn and May, while the plants are mostly shut under glass In plants more freely exposed to the free air, in the increasing warmth of spring, and in having the full open air in summer, from June or July till September, the impregnation is effected mostly or wholly by nature. The male flowers, being by some ignorantly denominated false blossoms, are often plucked wholly off as useless, under a notion of strengthening the plant: but this should not be generally done. Where crowded too thick in clusters some may be thinned out moderately; but their agency being absolutely necessary in fertilizing the females, they should only be displaced as they begin to decay, except where they are superabundant."

Principal summer crop.—"The ground being dug and smoothed, line it into squares of six feet. In the center of each, dig a hole about fourteen inches deep; fill this with well rotted dung, and sow on it five or six cucumber seeds: cover these with mould, and, when they rise and take a rough leaf, select two to each hill, and draw out the remainder. This sowing cannot be safely made in our climate till the 10th of May. For the fall and pickling crops, you must sow the first or second week in July."—*Armstrong.*

Those cucumbers, which are sowed as late as July, will not require topping or cutting off the runners as before directed, for at this season vegetation will be less vigorous and there will be less danger of the plant running too much to vine.

Raising plants from cuttings.—" Instead of raising cucumber plants from seed, they may be raised from cuttings, and thus kept on from year to year in the following manner :—Take a shoot that is just ready for stopping, cut it off just below the joint, behind the joint before which the shoot should have been stopped ; then cut smooth the lower end of the shoot or cutting, and stick it into fine leaf or other rich mould about an inch deep, and give it plenty of heat, and shade it from the rays of the sun till it be fairly struck. By this method, as well as by that of laying, cucumbers may be propagated.

" Mearns, gardener at Shobden Court, near Leominster, propagates his cucumber-plants for a winter crop in this way, and " finds that the plants raised from cuttings are less succulent, and therefore do not so readily damp off, or suffer from the low temperature to which they are liable to be exposed in severe weather ; that they come into bearing immediately, as they have formed roots of sufficient strength to support their fruit, and do not run so much to barren vine as seedlings are apt to do." He takes the cuttings from the tops of the bearing shoots, and plants them in pots nine inches deep, half filled with mould. He then waters them, covers the tops of the pots with flat pieces of glass, and plunges them into a gentle bottom heat. " The sides of the pot act as a sufficient shade for the cuttings during the time they are striking, and the flat glass, in this and other operations, answers all the purposes of bell-glasses. The cuttings form roots, and are ready to put off in less than a fortnight."—*Hort. Trans.* vol. iv, p 411.

Cucumbers increased by layers.—" As soon as several flower-buds appear on a plant, bend the second or third joint of a branch below the blossom, fasten it firmly into the ground, and cut off the capillary point of the plant ; it speedily takes root, and must be separated from the parent stock ; as each root has only to supply a few fruits with nourishment, it saves room, labor and time, and affords a constant supply for eight, twelve, and more months, which is not so liable to degenerate as if they were raised from a variety of seeds "—*Gleanings in Husbandry.*

Culture.—In the culture of all the crops, give proper supplies of water in dry, warm weather, two or three times a week, or every day when very warm and dry. If the heat in the hot-beds, after three or four weeks or more, be much declined, and the nights or general season remain cold, let a moderate lining of hot dung be applied to both sides ; which will not only cause a reviving heat, but widen the bed for the roots and runners of the plants to extend.

Insects —" The fly, which is often very destructive to cucumbers, melons and pumpkins, may be killed by sprinkling a mixture of tobacco water and red pepper over the vines."—*Dom. Encyc.* Sprinkle the plants with a strong infusion of elder leaves; that of hops and of walnut-leaves is likewise recommended; or, suspend a diamond-formed piece of white paper, shingle, or other piece of wood, by a thread, tied to the end of a stick stuck in the ground at a small distance from the hill, so that the paper shall hang directly over the hill and near the plants. The air, by constantly vibrating the paper or shingle, will have a tendency to prevent insects from alighting on the plants. The surest way, however, is to inclose the hills with frames covered with gauze, or other cloth of a light texture. The following method of making sieves, or boxes, to protect cucumber vines, melon vines, &c. against the yellow bug, &c. was communicated to the editor of the *N. E. Farmer* by Mr. Levi Bartlett, of Warner, N. H., and published in that paper, vol ii, p. 305.

"Take a strip of pine board (about three fourths of an inch in thickness is most suitable) eight or ten feet in length, and four or five inches in width —plow one edge of it with a carpenter's plow or match plane—then mark off an equal number of side and end pieces; before sawing the side pieces, run a brad-awl through where you want to drive your nails, as it is not so likely to split as after it is sawed. The side pieces eleven inches long—ends eight inches long. They must be of this particular size, because one yard of millinet will just cover nine boxes; or a third of a yard will make three covers. After having nailed your boxes, and divided your millinet, have some thin strips or tongues, as the carpenters call them. Press these with the edges of the covers into the groove, which fastens them much cheaper and more expeditiously than small nails. I made about twenty last season, and they effectually secured them from the yellow bug, and (by sinking the edges of them in the earth a little) from worms. But if they were of no use but to guard against insects, they would be worth having, as they keep off the cold winds, and greatly promote the growth of the vines in the early part of the season."

To save seed.—"Select some best summer fruit from good, productive plants, which permit to continue in full growth till they become yellow. Then cut them from the vine, and place them upright on end, in the full sun, for two or three weeks, when they may be cut open, and the seed washed out from the pulp; spread it to dry and harden; then put it up in papers or bags for future sowing. It will remain good for many years; and seed of three or four years' keeping is preferable for early frame crops."—*Abercrombie.*

Uses.—"Cucumbers are a salubrious, cooling fruit, and may be safely allowed to consumptive patients, as they sweeten acrid humors, at the same time are gently laxative; but being in a considerable degree acescent, and sometimes attended with flatulency and diarrhea, such effects may be prevented by eating them with great moderation, or with the addition of vinegar and pepper, which counteract their natural coldness. If properly pickled (without coloring them with that poisonous metal, copper, or rendering them too acrid with stimulant spices,) they are an excellent antiseptic; yet we consider them highly improper either for children or wet nurses."—*Dom. Encyc.*

DANDELION.

Leontodon Taraxacum.

This is a hardy perennial plant, which is found growing spontaneously in Great Britain and the United States. Loudon says that this vegetable, "though regularly produced in London market, is seldom or never cultivated, being generally to be found in sufficient luxuriance by the sides of hedges and dry ditches. It might easily be propagated either by seeds or roots, and, if introduced as a garden plant, should have a rich, deep soil, and be carefully tied up and earthed round to blanch it effectually. Cut off all the flowers as they appear, to prevent the dispersion of the seed and the weakening of the plant. When salad is scarce, the dandelion might be dug up from road-sides in winter, and forced in pots like succory.

"*Use.*—The leaves in early spring, when just unfolding, afford a very good ingredient in salads. The French sometimes eat the young roots, and the etiolated [blanched or whitened] leaves with thin slices of bread and butter. When blanched, the leaves considerably resemble those of endive in taste. The root is considered an equally good substitute for coffee as chicory, and may, like that plant, be stored in cellars and barrels, for producing winter salad."—*Caled. Hort. Mem.* iv, 138. In this country, the dandelion has, we believe, been used for greens, or pot-herbs only, and we have never known it subjected to cultivation.

EGG-PLANT.

Solanum Melongena.—Melongene, Fr.—Tollapfel, Ger.

"There are two varieties of this plant, the white-fruited and the purple, cultivated for culinary purposes; the latter kind is preferable, and, when sliced and nicely fried, approaches, both in taste and flavor, nearer to that of a very nice fried oyster than, perhaps, any other plant.

"This delicious vegetable may be propagated by sowing the seed on a slight hot-bed the beginning of April or in March; and towards the latter part of May they should be planted in a rich, warm piece of ground, at the distance of two feet and a half asunder, every way, for the purple, or two feet for the white kind; and if kept clean, and a little earth be drawn up to their stems, when about a foot high, they will produce plenty of fruit. Or, the seed may be sown about the end of April, on a warm border, and planted out finally the beginning of June; but these will be rather late, and not produce fruit so abundantly, in the Middle or Eastern States as by the former method."—*M'Mahon.*

ENDIVE.

Chicorium Endivia.—*Chicorée*, Fr.—*Endivie*, Ger.

The endive is a hardy annual, a native of China and Japan, and introduced into Great Britain in 1548. The varieties are

Green curled leaves, | White curled leaves. | Broad-leaved Batavian.

Estimate of sorts.—" All the sorts are eligible for culture; but allot, principally, the green curled for the main crops of autumn and winter endive, this being of the most stocky, full growth, and hardiest to stand severe weather. As to the others, allot a smaller portion of the white curled for early summer and autumn use; of the broad-leaved kind, provide a moderate crop for autumn, till November or December; being by some esteemed preferable for stews and soups, though not much used in salads."

Propagation.—All the varieties are raised from seed, of which, for a seed-bed four feet by ten in length, half an ounce is sufficient.

Times of sowing.—" The proper seasons are—May, for a smaller early crop, and principally June and July to the beginning of August; for full and successive crops, all autumn and winter, till the following spring: for, if sown earlier than the middle of May or beginning of June, they will mostly run to stalk the same season before attaining mature, useful growth. If any are required for early young summer endive, sow only a small portion of the white curled in April or May, as the plants will soon run to seed. In the middle or towards the end of May, you may begin sowing moderately of the different sorts; but do not sow fully till nearly the middle of June, that the plants may stand without running to seed the same year. About the twelfth and twenty-fifth of that month, also at the beginning and middle of July, sow the main and successive crops, for autumn and winter; and a finer smaller sowing about the beginning of August, for late supplies in the end of winter and following spring.

FENNEL.

Anethum Fœniculum.—*L'Aneth*, Fr.—*Lillkraut*, Ger.

"The fennel is a perennial plant, naturalized in England, and found in chalky soils. The plant rises with finely cut leaves, and capillary leaflets, on a smooth, dark green, branched, tubular stalk, to the height of five or six feet. On the summit are produced umbels of gold-colored flowers, in July and August. The whole plant is aromatic, and has long been an inmate of the garden.

"*Use.*—The tender stalks of common fennel are used in salads; the leaves, boiled. enter into many fish sauces; and, raw, are garnishes for several dishes. The blanched stalks of the variety called *finochio* are eaten with oil, vinegar and pepper, as a cold salad, and they are likewise sometimes put into soups.

"*The varieties* are—

The common, or sweet,
Dark-green-leaved,
Dwarf, or finochio. This variety is characterized by a tendency in the stalk to swell to a considerable thickness. This thickened part is blanched by earthing up, and is then very tender. 'Owing to the peculiar nature of this variety,' Neill observes, 'it is more tender than the common fennel, and often perishes in the course of the winter. Misled by this circumstance, several horticultural writers describe it as an annual species, under the appellation A. *segetum*.

"*Propagation.*—They are all raised from seed, of which half an ounce is sufficient for a seed-bed four feet by six feet. Sometimes, also, they are raised from offsets from the old plants, where only a few are wanted. 'Sow in the spring in light earth, either in drills from six to twelve inches apart, or broad-cast and raked in. When the plants are three or four inches high, thin or transplant a quantity fifteen inches asunder. As the roots of old plants divide into side offsets, these may be slipped off in spring, summer, or autumn, and planted a foot apart. They will produce immediate leaves for present supply, and in continuance; or, for an immediate larger supply of leaves, you may procure some established full roots, and plant as above. Let them be well watered.'

"*Subsequent culture.*—'The same plants remain several years by the root; but as fennel sends up strong stems for seed in summer, these, or a part of them, should be cut down, to encourage a production of young leaves below, in succession. It is apt to spread more than is desirable, if suffered to seed. The swelling stems of the finochio variety, when of some tolerable substance, should be earthed up on each side five or six inches, to blanch them white and tender. This will be effected in ten days or a fortnight; and, by successive sowings, or cutting down plants during summer, successive crops of blanched stalks may be had from June to December.'

" *To save seed.*—'Permit some of the best stalks to shoot; they will produce large umbels of seed in autumn.'—*Abercrombie*."—*Loudon*.

LEEK.

Allium Porrum.—*Porreau*, Fr.—*Lauch*, Ger.

The leek is a hardy biennial, a native of Switzerland. The stem rises three feet, and is leafy at bottom; the leaves an inch wide.

The narrow-leaved, or Flanders leek;	The broad-leaved, or tall, London leek.
The Scotch, or flag, or Musselburgh leek;	

Propagation.—"From seed; and, for a bed four feet wide by eight in length, one ounce is requisite."

Soil and site.—"The soil should be light and rich, lying on a dry sub-soil. A rank soil does not suit it, so that, when manure is necessary, well reduced dung, mixed with road drift, is better than dung alone. The situation should be open. Let the ground be dug in the previous autumn, ready for sowing in the spring. For the principal crop allot beds four or five feet wide, and sow in drills, about sixteen inches apart. A small crop may be sown thinly with a main crop of onions, and when the latter are drawn off, the leeks will have room for full growth.'

Times of sowing.—"A small first crop may be sown as soon as the ground is dry enough, and the weather sufficiently mild in the spring. The principal crop should be sown the last of April or the beginning of May."

Course of culture.—"When the plants are three or four inches high, weed them clean, and thin them where too much crowded. Water well in dry, hot weather. The leek is much improved in size by transplanting; and those designed for that purpose will be fit to remove when from six to ten inches high. For this purpose, take out a quantity, regularly, from the seed-bed, either in showery weather, or after watering the ground. Trim the long, weak tops of the leaves, and the roots and fibers, and plant them by dibble, in rows, from nine to twelve inches asunder, by six or eight inches in the row, inserting them nearly down to the leaves, or with the neck part mostly into the ground, to whiten it a proportionate length. Press the earth to the fibers with the dibbler, but leave the stem as loose as possible, and, as it were, standing in the center of a hollow cylinder. Give water if the weather be dry. Those remaining in the seed-bed thin to six or eight inches distance. Keep the whole clear from weeds. In hoeing.

loosen the ground about the plants, to promote their free, vigorous growth. Some plant in hollow drills, and earth up, as in celery culture, which produces very large stems."

To save seed.—"Transplant some best, full plants, early in the spring, in a sunny situation, or in a row near a south fence. They will shoot in summer, in single, tall seed-stalks. Support them, as necessary, with stakes; and they will produce ripe seed in September. Cut the ripe heads with part of the stalk to each; tie two or three together, and hang up under cover, to dry and harden the seed thoroughly, when it may be rubbed out, cleaned, and put by for future service."—*Abercrombie.*

Use—"The whole plant is used in soups and stews, but the blanched stem is most esteemed. Leeks formerly constituted an ingredient in the dish called *porridge*, which some suppose to be derived from the Latin *porrum.*"—*Loudon.*

"The leaves of this plant possess a flavor similar to that of onions, affording a constant dish at the table of the Egyptians, who chop them up small, and eat them with their meat. They are also in great esteem among the Welsh; and their general utility, as a wholesome pot-herb, renders them a valuable culinary spice."—*Willich.*

LETTUCE.

Lactuca Sativa.—*Laitue*, Fr.—*Gartensalat*, Ger.

Lettuce is a hardy annual plant, introduced or cultivated in England in 1562, but from what quarter is not known.

Varieties.—These are very numerous; and, from their names, many of them appear to have come originally from the Greek Islands, and the coast of the Levant. Those mentioned in Mr. Russell's Catalogue are—

Early curled Silesia,
Large green-head, or cabbage,
Royal cape (*superior quality*),
India Lettuce (*fine*),
Imperial cabbage,
Hardy green,
Brown Dutch cabbage,
Grand admiral (*large fine cabbage*),
Tennis-ball, or rose,
Magnum bonum Cos,
Brighton Cos,
Ice Cos,
White Cos, or loaf,
Green Cos.

Estimate of sorts.—The cabbage lettuces are round-leaved, growing in a compact, full head, of squat form, close to the ground. All the Cos lettuces, in their general growth, are more or less upright, of an oblong shape. Both kinds have white, close, firm heads, when in perfection; the varieties reach maturity from June till September. Meanwhile, they are occasionally used in young, open growth. In a very young state, the cabbage-lettuces have a milder, more agreeable taste than the Cos; but when both classes are full grown, the flavor of the Cos is preferred for salads, while the cabbage kinds are more used for soups.

Propagation.—From seed, of which, for a seed-bed four feet wide by ten feet in length, a quarter of an ounce is sufficient, and will produce upwards of four hundred plants.

Soil and situation.—"All the sorts grow freely on any rich, mellow soil, where the sub-soil is dry. For the most part, raise this vegetable as a principal crop, on beds set apart for it, and keep the varieties separate; but to multiply the supplies throughout summer, portions may be sown, thinly intermixed with principal crops of leeks, onions, carrots, and spinage, which will come off before the lettuces are full grown; also with any young perennials, which stand at wide intervals."

Times of sowing.—To obtain a constant supply of good lettuce, it is serviceable to sow every month, from February (or the opening of spring) to July, for the main summer and autumn crops. For late autumn crops, you may sow in August, and if you have hot-beds, frames, &c., you may sow in September, and so on, through the fall and winter. Early spring lettuce may be sowed so late in the fall as not to come up till spring.

Process of sowing.—Abercrombie says, "The ground should have been broken in the previous digging. Sow broad-cast, moderately thin; rake in lightly, and very even." Others direct to sow in drills, from a foot to sixteen inches apart. Armstrong observes, that "the straight-leafed sort is best cultivated in broad-cast, and does not require transplanting; but that the curled and head-lettuce cannot succeed without it."

Management of the summer crop.—"In the successive crops, raised from the opening of spring till the close of summer, when the plants reach about two, three, or four inches' growth, they should be thinned; of those removed, let a requisite number be planted out, from a foot to fifteen inches asunder, to remain for cabbaging. Such as continue in the seed-beds may be either gathered thinningly, in progressive stages, till the final reserve advance in close-heading; or, as they increase in size, be planted out at the square distance mentioned above, especially those designed to stand till of stocky growth. In dry weather, water well at transplanting; also weed and hoe the beds thinned, and water them, if necessary. In the first heading-crop of Cos lettuces, when about three parts grown, and beginning to close the inner leaves, a number may be forwarded in cabbaging, by tying the leaves together, moderately close, with strings of bass; the remainder will head and whiten in due time, without this assistance.

Crop raised on heat.—"For an accelerated crop, some may be sown in the beginning or middle of February, on a gentle hot-bed. When the plants are one or two inches high, in March or April, prick a portion either into a warm border, if a mild season, and let them be shielded with mats during nights and bad weather, or into a frame or slender hot-bed, to bring them more forward. According to their progress in April or May, transplant them into the open garden, from six to twelve inches asunder, to remain for heading."

To save seed.—"Leave or transplant either some of the early winter-standing plants, in March or April, or of the forwardest spring-sown crops, in May, or the beginning of June, fifteen inches asunder. They will produce ripe seed in August or September."—*Abercrombie.*

Use.—The use of lettuce, as a cooling and agreeable salad, is well known; it is also a useful ingredient in soups. It has medical properties, similar to those of opium. The refuse leaves are said to be good food for geese, ducks, and swine

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MELON.

Cucumis melo, and *Cucurbita citrillus.*—*Melon*, Fr.—*Melone*, Ger.

There are but two species, the melon with a rough or embroidered coat, called musk-melon, (*cucumis melo*,) and the melon with a smooth skin, called water-melon, (*cucurbita citrullus.*) Of each of the species there are many varieties. Mr. Russell's Catalogue contains the following:—

CUCUMIS MELO.
Green citron, (*finest variety*,)
Murray's pine apple,
Persian,
Nutmeg,
Minorca,
Large cantaleupe,
Pomegranate.

CUCURBITA CITRULLUS.
Carolina water,
Long Island do.
Apple-seeded do. (*early.*)

Seed.—Those who wish to procure melons in perfection, must be careful, in the first place, to procure good seed; secondly, to plant them remote from an inferior sort, as well as from cucumbers, squashes, gourds, and pumpkins; as degeneracy will infallibly be the consequence of inattention to these directions. Abercrombie says, "Seed under the age of two years is apt to run too much to vine, and show only male flowers; but new seed may be mellowed by being carried in the pocket a fortnight or more, till the heat of the body has dried and hardened it. Seed twenty years old has been known to grow, and make fruitful plants; but seed which has been kept three or four years is quite old enough, and less likely to fail than older."

Soil.—Abercrombie says, "The melon will succeed in any unexhausted loam, rich in vegetable rudiments, with a mixture of sand, but not too light. The following is a good compost; two thirds of top-spit earth from a sheep-common, adding sharp sand, if the earth contains little or none, till half is sand; one sixth of vegetable mould, and one sixth of well consumed horse-dung. Or, if the earth is not obtained from a sheep-pasture, rotted sheep-dung may be substituted for the last. The ingredients should have been pulverized and incorporated by long previous exposure and turning over." Dr. Deane observed that "a good manure to be put under melons is an old compost of good loam, with the dung of neat cattle or swine."

Sowing melons in the open ground.—Mr. Armstrong says, "To succeed in raising them for market, the Honfleur method, as described by M. Calvel, may be employed. Select a spot well defended against the north wind, and open to the sun throughout the day. If such is not to be found in your garden, create a temporary and artificial shelter, producing the same effect. At the end of March, form holes two feet in diameter, and distant from each other seven feet and a half; fill these with horse-dung and litter, or a mixture of mould, dung and sand. At the end of twenty days, cover the holes, which have been thus filled, with hand-glasses. When the heat rises to 36 of Reaumur, (113 Fahr.,) sow the seeds four inches apart; and when the plants have acquired two or three leaves, pinch off the end of the branch or runner. This will produce lateral branches, which must again be pinched off, as soon as they respectively attain to the length of ten inches. When the plant has outgrown the glass, the latter becomes useless, and may be removed; but, should the weather be wet or chilly, substitute coverings of clean straw for that of the glasses, until the young plant becomes strong enough to bear the open air. Two or three melons only are left on each vine, and under each of these is placed a slate, without which the upper and under side will not ripen together. Two months are required to mature them. The people of Honfleur attribute their success in melon-raising to the *sea-vapor* which surrounds them, and to the *saline* particles contained in it, an advantage to be anywhere commanded, by dissolving a little salt in the water employed to moisten them." Whether a bed of slate would prove too warm for the melon in our climate, we cannot say. Perhaps shingles or boards might be preferable, as they would not be rendered so hot by the noon-day sun, nor so cold by the night air We have never known salt, either in substance or solution, used as a manure for melons, but think it would be well to try its effects.

The following are M'Mahon's directions for raising melons in the open ground. Some time in May, "prepare a place of rich, sandy ground, well exposed to the sun; manure it, and give it a good digging; then mark it out into squares of six feet every way; at the angle of every square dig a hole twelve inches deep, and eighteen over, into which put seven or eight inches deep of old hot-bed dung, or very rotten manure; throw thereon about four inches of earth, and mix the dung and earth well with the spade; after which draw the remainder of the earth over the mixture, so as to form a round hill about a foot broad at top. Some people use hot stable dung under an idea that its heat would promote the vegetation of the seed: this is a mistaken notion, as, in a few hours, it loses all it had, for want of a sufficient quantity being together to promote fermentation, and becomes a dryish wisp, unfit, at least for the present, to afford either heat or nourishment to the plants.

"When your hills are all prepared as above, plant in each, towards the center, eight or nine grains of good melon-seed, distant two inches from one another, and cover them about half an inch deep."

After-culture.—"When the plants are up, and in a state of forwardness, producing their rough leaves, they must be thinned to two or three in each hill: the extra number in some may serve to fill up deficiencies in others: draw earth from time to time round the hills, and as high about the plants as the seed-leaves; when fit stop them. This operation should be performed when the plants have two rough leaves, and when the second is about an inch broad, having the first runner-bud rising at its base; the sooner this is detached, the sooner the plants acquire strength, and put out fruitful runners.

"It is to be done in the following manner:—

"You will see arising in the center of the plant, at the bottom of the second rough leaf, the end of the first runner, like a small bud; which bud or runner, being the advancing top of the plant, is now to be taken off close, and may be done either with the point of a penknife or small scissors, or pinched off carefully with the finger and thumb; but, whichever way you take it off, be careful not to go so close as to wound the joint from whence it proceeds."

Armstrong says, "If the branches be vigorous and long, stretch them carefully over a level surface, and bury every fourth or fifth joint. This is best done by means of a wooden crotchet. The objects of pinching, or shortening the stem, are thus completely fulfilled, without any of the risk which attends that operation, and with advantages peculiar to this method; as, wherever the plant is buried, new roots are formed for the better nutrition of the stem and the fruit."

Setting.—"As the fruit-bearers come into blossom, you may assist the setting of the fruit, by impregnating some of the female blossoms with the male flowers, as directed for the cucumber. The melon, however, will also set naturally, and produce fertile seeds, if the time of fructification fall at a season when the glasses can be left almost constantly open."—*Aber.* Nicol says he has "proved, experimentally, that melons not impregnated will not swell off so fair and handsome as impregnated ones, and therefore considers it more necessary to attend to this operation in melons than in cucumbers."—*Loudon.*

Care of the fruit.—As the fruit increases to the size of a walnut, place a flat tile or slate under each, to protect it from the damp of the earth; the slab, thus interposed, will also assist the fruit to ripen, by reflecting the rays of the sun—*Aber.* Nicol advises placing the fruit on bits of slate or glass some time before it begins to ripen ; but by no means slate or moss the whole surface of the bed.

Forcing melons.—The "*Honfleur* method" of forwarding the production of melons, as stated by Mr. Armstrong, has been given, p. 64. The same writer continues, "If we want melons at a period earlier than this method will give them, we must employ a higher degree and a longer continuance of artificial heat; in a word, we must resort to *hot-beds*, and in these the point most important and difficult of attainment at the same time is, to secure a certain degree of heat, and no more, throughout the whole process. To lessen the difficulty in this case, gardeners, who understand their trade, make choice of those varieties which have the thinnest skins and the least bulk, as experience proves that, other things being equal, they require less heat than those of thicker rinds and greater size, and are of course less subject to some of the accidents to which this species of culture is exposed. In choosing the seeds, those of the last year are only to be used, because they are of quicker vegetation than old ones, and, accordingly, best fulfill the intention of the hot-bed, which is, to give *early* fruit. Another practice conducive to the safety of the plants, is, to sow the seeds in small pots, and then to plunge them into a hot-bed. If the heat be deficient, they are, in this case, made no worse than they would have been, if sown directly in the bed; and if it be excessive, it is only necessary to raise the pots, without in the smallest degree disturbing the plant. These things being premised, it but remains to show what ought to be the subsequent management after the seed has been sown, and the pots placed under the frames. One of the most important points now to be observed, is sufficiently to ventilate the bed, as well before as after the plants show themselves. This should be done at mid-day and in sunshine, and as often as a necessity for it shall be indicated by an accumulation of steam under the glasses. At night, these (the glasses) should be carefully covered with matting. These two preliminaries (ventilation in the day, and covering at night) being carefully observed, your plants will soon show themselves in a vigorous and healthy state, and may be kept in that condition by a continuation of the same means, and by moderately moistening the earth when it shall have become too dry. The water employed should be of the same temperature of the air under the frames; and, to secure this, it is well to keep a supply of it in a pot, placed in a corner of the hot-bed. In about a month, the plants thus raised, will be fit for transferring to a second and larger hot-bed, constructed like the preceding, with the exception, that the mass of dung must now be greater, and that, after earthing, the bed should not be less than three and a half or four feet in depth. The plants, with the earth in which they grow, are now to be taken from the pots—an operation in which practice only will make us expert, and which consists in placing the neck of the plant between the first and second finger of the left hand, reversing the pot, and gently striking its sides till the earth be disengaged. The discharged mass is then placed in a hole, previously prepared in the square, where it is intended the plant shall ripen and produce."

Cutting the fruit.—Nicol observes, that " Melons, if allowed to remain on the plant till they be of a deep yellow color, lose much of their flavor. They should, therefore, be cut as soon as they begin to change to a greenish-yellow, or, rather, as soon as they begin to smell ripe. They may lie in a frame for a day or two, if not immediately wanted, where they will acquire sufficient color. But if they are let remain many days in the frame, they will become as insipid as if they had been left too long on the plant."

Saving seed.—The ordinary mode is to request the seeds of particularly fine fruits of approved sorts to be returned from table. The best way, however, is to pick some best ripe fruit, take out the seed, clean it from the pulp, and let it be well dried and hardened; and then put it up in papers.—*Abercrombie.* Nicol says, wash it very clean, skimming off the light seeds, as those only which sink in water will grow. Great care must be taken that the sorts from which seeds are saved are genuine and distinct. When different sorts are planted in the same bed, this cannot be the case.

Second crop from the same plants.—" When the fruit of the first crop is off, a second crop may be obtained from the same stools, which often proves more productive than the first. If the first crop is taken before the middle of June, the second will come at a very good time. For this purpose, as soon as the fruit is cut, prune the plant. Shorten the vigorous, healthy runners, at a promising joint, to force out new laterals, cutting about two inches above the joint. At the same time, take off all decayed or sickly vines, and all dead leaves. Stir the surface of the mould, and renew it partially by three inches depth of fresh compost. Water the plants copiously, shutting down the glasses for the night. Shade in the middle of hot days; and give but little air, until the plant has made new radicles and shoots. Afterwards repeat the course of culture above described, from the stage when the first runners are sent out till fruit is cut."—*Loudon*

Insects and diseases.—To prevent melon-plants from being infested with insects, or injured by diseases of any kind, no better method can be adopted than to keep the plants constantly in a healthy, vigorous, growing state; for this purpose, M'Phail observes, " They must be constantly attended to, giving them plenty of heat and water. In warm weather, in the spring and in summer, they should be watered occasionally all over their fruit and leaves, till the earth in which they grow be thoroughly moistened." In this country, melons and cucumbers are much infested by a small yellow bug, and perhaps the best method of securing them is covering the plants with a frame.

on which millinet is stretched and fastened, as directed under the article CUCUMBER.

Use.—The use of melons, as a palatable and wholesome article of diet, is too well known to need any remarks. Dr. Mease, of Philadelphia, observes, that "The juice of the sweeter kind of water-melon yields, on inspissation, a bright-colored syrup, which would answer every purpose required of any syrup. Mr. Henry Drinker, of Philadelphia, procured half a pound of this syrup, from fourteen pounds of melon juice, a part of which I tasted, and found very pleasant." To make the most of unripe melons, Loudon's Magazine directs to "boil them, and season them with spices and salt, or bake them like a pumpkin-pie." The rind of the water-melon is also used for pickling, &c.

MINT.

Mentha Viridis.—*Menthe*, Fr.—*Münze*, Ger.

THIS is a genus of plants comprising twenty-four species. Those cultivated in gardens are peppermint, (*M. piperita;*) spearmint, (*M. viridis;*) pennyroyal-mint, (*M. pulegium.*)

Culture.—All "the species are raised by the same methods, viz., by parting the roots, by offset young plants, and by cuttings of the stalks. Spearmint and peppermint like a moist soil; penny-royal, a strong loam. The plants set in spring or summer will come into use the same year. They may be placed about eight inches apart, on beds about four feet wide, allowing a path two feet broad. New beds should be made every three years.

Gathering the crop, and use.—"Mint should be cut for drying," says Philips, "just when it is in flower, and on a fine day; for if cut in damp weather, the leaves will turn black. It should be tied in small bunches, and dried in a shady place, out of the wind; but, to retain its natural virtues more effectually, it has been found better to place the mint in a screen, and to dry it quickly before a fire, so that it may be powdered and immediately put into glass bottles, and kept well stopped. Parsley, thyme, sage, and other herbs, retain their full fragrance when thus prepared, and are by this mode secured from dust, and always ready to the hand of the cook.

"A conserve made of mint is grateful, and the distilled waters, both simple and spirituous, are much esteemed. The juice of spearmint, drank in vinegar, often stops the hiccup. Lewis observes, what has before been observed by Pliny, that mint prevents the coagulation of milk, and hence it is recommended in milk diets."

MUSHROOM.

Agaricus Campestris.—*Champignon cultivé*, Fr.—*Pil*. Ger.

This is a genus of plants comprising a great many species, of which, according to some authors, three hundred are natives of Great Britain. The kind cultivated in gardens is the *Agaricus campestris*, which is thus described by M'Mahon :—"The *gills* of this are loose, of a pinky red, changing to liver color, in contact, but not united with the stem ; very thick set, some forked next the stem, some next the edge of the cap, some at both ends, and generally, in that case, excluding the intermediate smaller gills. *Cap*, white, changing to brown when old, and becoming scurfy, fleshy, and regularly convex, but with age flat, and liquefying in decay ; *flesh* white ; diameter commonly from one inch to three, or sometimes four or more. *Stem* solid, one to three inches high, and about half an inch in diameter."

Loudon says, "The mushroom is a well known native vegetable, springing up in open pastures in August and September. It is most readily distinguished, when of middle size, by its fine pink or flesh-colored gills, and pleasant smell ; in a more advanced stage, the gills become of a chocolate color, and it is then more apt to be confounded with other kinds of dubious quality ; but that species which most nearly resembles it, is slimy to the touch, and destitute of the fine odor, having rather a disagreeable smell : further, the noxious kind grows in woods, or on the margins of woods, while the true mushroom springs up chiefly in open pastures, and should be gathered only in such places."

Mr. Armstrong gives the following directions for cultivating the garden mushroom :—"Prepare a bed, early in October, either in a corner of the hothouse, if you have one, or a dry and warm cellar. The width of the bed at bottom should not be less than four feet, and its length in proportion to the spawn provided. Its sides should rise perpendicularly one foot, and should afterwards decrease to the center, forming four sloping surfaces. We need hardly say that the material of the bed at this stage of the business must be horse-dung, well forked, and pressed together to prevent its settling unequally. It should then be covered with long straw, as well to exclude frost as to keep in the volatile parts of the mass, which would otherwise escape After ten days, the temperature of the bed will be sufficiently moderated. when the straw is to be removed, and a covering of good mould to the depth of an inch, laid over the dung. On this the seed or spawn of the mushroom [which are threads or fibers of a white color, found in old pasture grounds, in masses of rotten horse-dung, sometimes under stable-floors, and frequently in the remains of old hot-beds] is to be placed in rows, six inches apart, occupying all the sloping parts of the bed, which is again to be covered with a second inch of fresh mould and a coat of straw. If your bed has been well constructed, your mushrooms will be fit for use at the end of five or six weeks, and will continue to be productive for several months. Should you, however, in the course of the winter, find its productiveness diminished, take off nearly all the original covering, and replace it with eight or ten inches of fresh dung and a coat of clean straw. This, by creating a new heat, will revive the action of the spawn, and give a long succession of mushrooms."—*Mem. of N. Y. Board of Agr.* vol. ii, p. 125.

Use.—The garden mushroom is eaten fresh, either stewed or boiled; and preserved as a pickle, or in powder, or dried whole. The sauce commonly called *ketchup* (supposed, by Martyn, from the Japanese *kit-jap*) is or ought to be made from its juice with salt and spices. Wild mushrooms from old pastures are generally considered as more delicate in flavor, and more tender in flesh, than those raised in artificial beds. But the young or butter mushrooms, of the cultivated sort, are firmer, and better for pickling; and in using cultivated mushrooms, there is evidently much less risk of deleterious kinds being employed."—*Neill* and *Martyn.*

" *Antidote to poisonous sorts.*—All fungi should be used with great caution, for even the *champignon* and edible garden-mushrooms possess deleterious qualities when grown in certain places. All the edible species should be thoroughly masticated, before taken into the stomach, as this greatly lessens the effects of poisons. When accidents of this sort happen, vomiting should be immediately excited, and then the vegetable acids should be given, either vinegar, lemon-juice, or that of apples; after which, give ether and anti-spasmodic remedies, to stop the excessive bilious vomiting. Infusions of gall-nut, oak-bark, and Peruvian bark are recommended as capable of neutralizing the poisonous principle of mushrooms. It is, however, the safest way not to eat any of the *good*, but *less common* sorts, until they have been soaked in vinegar. Spirits of wine and vinegar extract some part of their poison; and tannin matter decomposes the greatest part of it."—*Botanist's Companion,* vol. ii, p. 145.

MUSTARD.

Sinapis.—*Moutarde*, Fr.—*Senf*, Ger.

Of this plant there are two species in cultivation, the *black* and the *white*, annuals, and natives of Great Britain.

The following are Loudon's directions for the culture of the white mustard, *S. alba.* For spring and summer consumption, sow once a week or fortnight, in dry, warm situations, in February and March; and, afterwards in any other compartment. "In summer, sow in shady borders, if it be hot, sunny weather; or, have the bed shaded. Generally, sow in shallow, flat drills, from three to six inches apart; scatter the seed thick and regular, and cover in thinly with the earth, about a quarter of an inch. To furnish gatherings in winter or early in spring, sow in frames or under hand-glasses; and when the weather is frosty, or very cold, in hot-beds and stoves."

Use.—"This species," according to Loudon, "is cultivated chiefly as a small salad, and is used like cresses, while in the seed: when these are newly expanded, they are mild and tender; but when the plants have advanced into the rough leaves, they eat rank and disagreeable." "In Spain, and throughout the south of Europe, the seed of the white species is preferred, for the fabrication of mustard, because giving a whiter and milder flour than the seed of the black."—*Armstrong.*

The seed of this plant is also celebrated for its medical virtues, being at once a tonic and an aperient; cleansing the stomach and bowels, and bracing the system at the same time.—See *N. E. Farmer*, vol. vi, p. 188.

BLACK MUSTARD.—*S. nigra*—is a larger plant than the white, with much darker leaves, and their divisions blunter.

Use.—"Black mustard is chiefly cultivated in fields for the mill, and for medicinal purposes. It is sometimes, however, sown in gardens, and the tender leaves used as greens, early in the spring. The seed leaves, in common with those of the cress, radish, rape, &c , are sometimes used as a salad ingredient; but the grand purpose for which the plant is cultivated, is for seeds, which, ground, produce the well known condiment. If the seeds, Dr. Cullen observes, be taken fresh from the plant, and ground, the powder has little pungency, but is very bitter; by steeping in vinegar, however, the essential oil is evolved, and the powder becomes extremely pungent. In moistening mustard-powder for the table, it may be remarked, that it makes the best appearance when rich milk is used; but the mixture, in this case, does not keep good for more than two days. The seeds of both the black and white mustard are often used, in an entire state, medicinally."

Culture for the mill.—"To raise seed for flour of mustard, and other officinal occasions, sow, either in March or April, in any open compartment; or make large sowings in fields, where designed for public supply. Sow moderately thick, either in drills, from six to twelve inches asunder, or broadcast, and rake or harrow in the seed. When the plants are two or three inches in the growth, hoe and thin them moderately where too thick, and clear them from weeds. They will soon run up in stalks, and, in July or August, return a crop of seed ripe for gathering."—*Abercrombie.*

ONION.

Allium cepa.—Oignon, Fr.—*Zwbiel*, Ger.

The common bulbous onion is a biennial plant, supposed to be a native of Asia. There are many varieties of this plant. Those mentioned in Mr. Russell's Catalogue are the following:—

White Portugal,
Yellow,
Genuine Madeira,
Top or tree onion,
Silver-skinned,
Strasburgh,
Large red,
Potato onion.

The Strasburg is most generally adopted for principal crops. The silver skinned is reckoned among the best for pickling. "The top or tree onion has the remarkable property of producing the onions at the top of the stalk, and is valuable for domestic use, particularly for pickling, in which they are excellent, and superior in flavor to the common kinds. It is also used for any other purpose that onions usually are. It is perennial, and propagated by planting the bulbs in spring or autumn, either the roots, bulbs, or those on the top of the stalks."—*Russell's Catalogue.*

Soil and culture.—The onion, "to attain a good size, requires rich, mellow ground, on a dry sub-soil. If the soil be poor or exhausted, recruit it with a compost of fresh loam and well-consumed dung, avoiding to use stable-dung in a rank, unreduced state. Turn in the manure to a moderate depth; and, in digging the ground, let it be broken fine. Grow pickles in poor, light ground, to keep them small. The market-gardeners at Hexham sow their onion-seed on the same ground for twenty or more years in succession, but annually manure the soil. After digging and leveling the ground, the manure, in a very rotten state, is spread upon it, the onion-seed sown upon the manure, and covered with earth from the alleys, and the crops are abundant, and excellent in quality."—*Hort. Trans.* i, 121.

Deane's *New England Farmer* says, "A spot of ground should be chosen for them, which is moist and sandy; because they require much heat and a considerable degree of moisture. A low situation, where the sand has been washed down from a neighboring hill, is very proper for them. And if it be the wash of a sandy road, so much the better. The most suitable manures are old, rotten cow and horse dung mixed, ashes, but especially soot. A small quantity of ashes or sand, or both, should be spread over them after sowing, especially if the soil be not sandy. And it is not amiss to roll the ground after sowing; or harden the surface with the back of a shovel."

Mr. Armstrong says, "It is propagated either by the seed or by the bulbs In the first case, you sow in shallow drills, twelve or fourteen inches apart cover with mould, and, when the plants come up, thin them, so that they may stand three or four inches from each other. The sooner this is done in the spring, after the earth has acquired a temperature favorable to vegetation, the better will be your crop. It only remains to keep the earth loose and clean about the roots, and, if the vegetation be too vigorous, to break down the tops, so as to determine the juices to the bulbs. In the other case you but employ the small and half-grown onion of the preceding fall instead of seed."

Mr. Hubbard, of Concord, Mass., in an article published in the *N. E. Farmer*, vol. iii, p. 89, says, "The soil ought to be a *deep*, *black loam*, that will crumble fine when the plow passes through it; such as is easily raked smooth and pulverized. A heavy clammy soil, that adheres together when both wet and dry—a dry, clayey, or a sandy soil, will not answer. I know of no vegetable that is so difficult to please with a soil, as the onion: though they will grow well, yet they will not ripen, but hold green throughout the fall, and many of them will be what are generally known by the name of *scullions*, with the neck stiff and green; whereas those on suitable ground are ripe and dry by the first of September. Rotten stable-manure, made in the winter preceding the spring in which it is put on the land, is generally made use of, to be spread on the ground, and plowed in. I have a piece of land four rods square, on which onions have been raised, I suppose, these *eighty years;* and since I have improved it, I have yearly spread upon it five cart-loads of manure, such as are usually drawn by one pair of oxen; and have raised from *four* to *seven hundred* bunches of onions upon it, at three and a half pounds to the bunch, of which about sixteen make a bushel."

Mr. Hubbard puts the seed into the ground as soon as the frost is out, and it is sufficiently dry to be worked; frequently the latter part of March, but more frequently in the first days of April. He has always planted them in *hills*, which is the general practice in Concord. "My method of preparing the ground and planting the seed is, *first*, carry on the manure, and spread it as even as possible, when the ground is to be plowed deep; *then* let the plat be divided into beds, about three feet nine inches wide; to do which the easier way is to stretch a line across, lining one bed at a time; after this, let a man, with a shovel or a potato-hoe, make an alley through the whole piece, to separate the beds, about four inches deep, and sufficiently wide to admit a person to walk in it. Then let the lumps be beat fine, leveling the ground, and shaping the beds; which, after being raked smooth, must be divided into squares of eight or nine inches. This is best done by a line; or it is sufficiently exact to draw a heavy rope backwards and forwards. Now let the seeds, six or seven in a hill, more or less, be dropped into the corners of the squares, and covered with mould, about half an inch deep, pressed down with the hand."

A writer for the *N. E. Farmer*, vol. iii, p. 249, with the signature J. M., recommends "a moist, black soil," as best, but says, "a free, deep loam will answer very well." "The onion is not by nature inclined to root deep You must give it a hard bottom to grow on, and keep your manure on the surface within reach of the roots; then they will grow large, flat, and handsome." Advises to sow the same piece for several successive years. "I have always *sowed onions in drills*, about eighteen inches apart, to give fair play to the hoe. Onions must be sowed as early as possible after the frost is out of the ground: in this climate, if the seed is not in the ground before the first of May, there is but little chance for a crop. It must be covered slightly and stamped well over with the hoe to close it well. I would recommend, as most essential, to sow the seed sparingly. Even the best gardeners are apt to put in too much seed. The consequence is, that the young plants come up so thick that they run up spiry and weak; and, when you come to thin them, you find great difficulty to pull up so many without injuring those that you leave; and the worst injury is what you do to the roots, which you tear and loosen. Therefore have seed of your own raising, or that you know is fresh, and sow sparingly."

In the *N. E. Farmer*, vol. iii, p. 265, are the observations of I. Tucker, Esq. of Salem, Mass., who says, "The land should be plowed about four inches in depth, and harrowed so as to make it very fine; the manure, which should always be a rich compost, should be plowed in and thoroughly mixed; the land should then be rolled with a heavy roller, to form a close bottom for the bulbs to form upon, and at the same time not so hard as to prevent the small roots of the plant from penetrating. The best onions and the largest crops are produced where the bulbs grow almost entirely on the top of the ground. After the ground has been rolled, and before the seeds are sown, the beds should be raked with a sharp iron rake, to prepare a finely pulverized drill for reception of the seed; and, after the seeds are sown, the drill should be pressed with a board and sufficient weight to bring the earth into close contact with the seed. Care should be taken in selecting seed; none should be sown but such as will be sure to vegetate; and it would be well if no more seed were to be sown than you would have plants to remain and grow in the drill. It would be superfluous to add that, if you would have a good crop of onions, you must not permit a crop of weeds to grow in the same bed; they will not grow well together."

Mr. Adams Knight of Newbury, Mass., received a premium of twenty dollars for having raised, in 1822, the greatest quantity of onions, being six hundred and fifty-one bushels on one acre. "The soil is a rich, gravelly loam, with a gravel bottom: in 1821 it was cultivated with onions and cabbages, and was manured with about five cords of barn manure, and produced a good crop: after the crop was off the ground, there were five cords of barn manure and two and a half of leached ashes plowed in in April

1822, it was once plowed, and sowed in rows 14 inches apart, which took between three and four pounds of seed: in the course of the season, it was hoed between the rows, and weeded four times: in September, the onions were harvested, and there were six hundred and fifty-one bushels. The entire expense of cultivating this acre of onions, including twenty-one dollars and thirty-seven cents, the cost of the manure, was fifty-seven dollars and thirty-eight cents."

The work entitled *Gleanings, &c., in Husbandry*, directs to sow onions, if possible, in a dry time, and to tread them in, in light ground.

Loudon says, "When onions are to be drawn young, two ounces of seed will be requisite for a bed four feet by twenty-four; but when to remain for bulbing, one ounce will suffice for a bed five feet by twenty-four feet."

Deane says, "The ground should be dug or plowed in autumn, not very deep; and then made very fine in the spring, and all the gross roots and roots of weeds taken out; then laid in beds four feet wide. Four rows of holes are made in a bed, the rows ten inches apart, and the holes in the rows ten. About half a dozen seeds are put in a hole, or more if there be any danger of their not coming up well, and buried an inch under the surface. They will grow very well in bunches. Though the largest onions are those which grow singly some inches apart, those which are more crowded produce larger crops; and the middle-sized onions are better for eating than the largest." The last week in April is the proper time for sowing, according to this author.

The course of culture recommended by Abercrombie for the summer, and what he calls winter-laid-by crops is as follows:—"Allot an open compartment, and lay it out in beds, from three to five feet in width. Sow broadcast, equally over the rough surface, moderately thick, bed and bed separately, and rake in the seed lengthwise each bed, in a regular manner. When the plants are three or four inches high, in May and June, let them be timely cleared from weeds, and let the principal crop be thinned, either by hand, or with a small, two-inch hoe; thinning the plants to intervals of from three to five inches in the main crops designed for full bulbing, or some beds may remain moderately thick for drawing young, by successive thinnings, to the above distance. For the Spanish, from seed obtained immediately from Spain, the final distance should be six or seven inches. Keep the whole very clear from weeds, in their young and advancing state. The plants will begin bulbing a little in June, more fully in July, and be fully grown in August to large bulbs. In July or August, when the leaves begin to dry at the points and turn yellow, lay the stems down close to the ground, bending them about two inches up the neck, which promotes the ripening of the bulb, particularly in wet or backward seasons. The crop of full bulbers will be ready to take up towards the middle of August. When the necks shrink and the leaves decay, pull them wholly up in due time. Spread them on a compartment of dry ground, in the full sun, to dry and harden completely, turning them every two or three days, and in a week or fortnight they will be ready to house. Clear off the grossest part of the leaves, stalks and fibers; then deposit the bulbs in some close, dry apartment, in which sometimes turn them over, and pick out any that decay; and they will thus keep sound and good all winter and spring, till May following."

Culture of a winter-standing crop to be drawn for use the succeeding spring.—"Allot a soil rather more light and sandy for the summer crop, on a subsoil at least equally dry. The compartment, especially for any of the biennial kinds, should lie warm and sheltered. The beds may be three or four feet wide, running parallel to the best aspect. The medium time for the principal sowing falls about the 7th of August, and, for a secondary crop, near the 25th Sow the bulbing sorts and the Welsh perennial separately; distribute the seed pretty thickly. If the soil be dry and light, tread down the seed evenly along the surface of each bed, and then rake it in neatly When the plants are come up one, two, or three inches, carefully hand-weed in time, before any rising weeds spread; not thinning the plants, because they should remain thick, for their chance in winter, and to be, by degrees, drawn thinningly, for use in salads and otherwise; but reserve a principal supply to remain till spring. Observe, the Welsh onion, in particular, commonly dies down to the ground about mid-winter; but the root part, remaining wholly sound, sends up a new, vigorous stem in February and March. At the opening of spring, let the whole of both sorts be well cleared from weeds; they will continue fit to draw young during all the spring months, till May; then let some of the bulbous kinds be thinned, to remain for early bulbing in June and July; but, as they will soon after shoot up in stalk, they are chiefly for present use, not being eligible as keeping-onions."

To preserve onions through the winter, they may be tied together, forming what are called ropes or bunches of onions, and kept in a dry and cool cellar. Moisture rots, and warmth causes them to vegetate. A considerable degree of cold will not injure them, for they resist frost in consequence of a spirituous substance of which they are in part composed. Searing their fibrous roots with a hot iron will prevent them from sprouting.

To obtain seed from onions, they should be planted early in beds, about nine inches apart. The largest and soundest are best. They should be kept free from weeds; and, when the heads of the flowers begin to appear, each plant must have a stake about four feet long, and its stems be loosely tied to the stake by a soft string; or the stems may be supported by stakes, six or eight feet apart, and pack-thread or rope-yarn fastened from one to the other, a little below the heads. When ripe, the heads are to be cut (or the seeds will shed) and spread in the sun, on coarse cloths, to dry—being, however, taken under shelter at night and in rain. When the seed is beaten out, it is to be dried one day in the sun, and then put in bags to preserve for sowing.

Dr Deane and Mr. Nicholson, author of the *Farmer's Assistant*, condemn the practice of beating or breaking down the tops of onions in order to increase the size of the root. Mr. Nicholson observed, "The practice is undoubtedly injurious, as we have seen confirmed by experiment."

"*Culture of the potato onion.*—This variety, erroneously supposed to have been brought from Egypt by the British army about 1805, was grown in Driver's nursery, in 1796, and has been known in Devonshire for upwards of twenty years It is thus cultivated at Arundel Castle by Maher:—Having thoroughly prepared the ground, and formed it into beds four feet wide, 'I draw lines the whole length, three to each bed, and, with the end of the rake-handle, make a mark (not a drill) on the surface; on this mark I place the onions, ten inches apart; I then cover them with leaf-mould, rotten dung, or any other light compost, just so that the crowns appear exposed. Nothing more is necessary to be done until they shoot up their tops; then, on a dry day, they are earthed up, like potatoes, and kept free from weeds, until they are taken up. In the west of England, where this kind of onion is much cultivated, I understand that it is the practice to plant on the shortest day, and take up on the longest. The smallest onions used for planting swell, and become very fine and large, as well as yield off-sets; the middle-sized and larger bulbs produce greater clusters.'—*Hort. Trans.* vol. iii, p. 305.

"Dymond states (*Hort. Trans.* vol. iii, p. 306), that in Devonshire it is planted in rows, twelve inches apart, and six inches' distance in the row; that the plants are earthed up as they grow, and that the smaller bulbs yield a greater increase than the larger. A similar practice is adopted by some Scotch cultivators.—*Caled. Hort. Mem.* vol. i, p. 344, and vol. iv, p. 216.

"Wedgewood does not earth up, and finds his bulbs acquire a much larger size than when that practice is adopted.—*Hort. Trans.* vol. iii, p. 403. The fact is, as we have observed in generalizing on the subject of earthing up, surface-bulbs, as the onion, turnip, &c., are always prevented from attaining their full size by that operation, whatever they may gain in other respects." —*Loudon.*

Use.—"The properties of onions in no respect differ from those of garlic excepting that the former are less pungent, and are, therefore, more generally used for culinary purposes. Many persons, however, dislike them on account of the strong and disagreeable smell which they communicate to the breath. But this inconvenience is obviated by eating a few raw leaves of parsley, immediately after partaking of onions, the scent of which is thus nearly removed, and they are, at the same time, rendered more easy of digestion. Vinegar also answers the same purpose."—*Dom Encyc.*

PARSLEY.

Apium Petroselinum.—Persil, Fr.—*Petersilie.* Ger.

The parsley is a hardy biennial, a native of Sardinia. The varieties, according to Loudon, are—

The common plain-leaved (*seldom cultivated*),
The curled or thick-leaved (*most esteemed*),
The broad-leaved, or large-rooted Hamburgh (*cultivated for its carrot-shaped root*)

Mr. Russell's Catalogue mentions the following kinds:

Curled or double—*Apium petroselinum crispum;*
Dwarf curled (*very much curled*), *do. do.;*
Hamburgh, or large-rooted, do. var. *tuberosum;*
Siberian (*very hardy, single-leafed, and of fine flavor*).

and adds, "sown from April to August. Parsley seldom vegetates under five weeks after sowing. It is recommended to soak the seed twelve hours in water mixed with sulphur. This process, with attentive watering, will cause the seed to vegetate in less than a fortnight." The seed should be fresh. Loudon says, two years old seed will not grow.

Culture of the pot-herb kinds.—"One sowing in spring will mostly furnish young leaves all the year; though, to answer a constant demand, many persons make successive sowings from February [in Great Britain] to May. Some also sow early in autumn for young parsley in winter and spring; but such a supply is better provided by cutting down established plants. Sow in a single drill along the edge of any compartment, or occasionally in rows nine or twelve inches asunder. Draw small drills, something less than an inch deep; in which drop the seed moderately thick, and cover a little above half an inch. The plants will come up in three or four weeks, and, when two or three inches high, may be gathered as wanted, all the summer, winter, and following spring till May, when they will go to seed. Have always a young crop sowed timely in the spring to succeed the declining old plants. In gathering pot-herb parsley, cut close and regular. In summer, when the plants grow rank, yielding more leaves than can be used, cut them close to the bottom, and they will shoot up stocky, and in a regular, close growth. Observe also to do the same in autumn, about the end of September, that the plants may form heads of fresh young leaves before winter. On the approach of frosty weather, protect them with haulm," straw, or any thing else, which will serve for a defense against cold.

Culture of Hamburgh Parsley.—"To obtain large roots, allot a compartment where the soil is deep, and has been well digged. Any common mould will suit, if dry and not too rich. Sow in February, [soon as the frost is well out of the ground,] March, or early in April, in one or more beds, either in drills nine inches asunder, or broad-cast, and rake in. The plants should be thinned to nine inches distance, to give room for proper growth in the roots; for use in August, September, October, and thence till the following spring. On the approach of frost, take up some roots, and preserve them in sand. A sowing may be made the third week in June, where young roots are wanted in winter."

The Siberian, or single-leafed parsley, is cultivated in fields. It may be sown very early with oats or other spring grain, mixed with grass seed.—*See Encyc. of Agr.* parag. 5081.

Uses.—This herb is much used and highly valued for culinary purposes as a pot-herb, for garnishes, &c. The Hamburgh parsley is esteemed for its large, carrot-like root, drawn in autumn and winter for the table. In field cultivation it is said to be a preservative from rot in sheep, and efficacious in curing greasy and surfeited horses, &c.—*See New England Farmer*, vol. vi, page 182.

PARSNEP.

Pastinaca sativa.—*Panais*, Fr.—*Pastinake*, Ger.

Loudon observes, that "There is only one variety of the Parsnep in general cultivation in Great Britain, but the French possess three—the *Coquaine* the *Lisbonaise*, and the *Siam*. The *Coquaine*, Dr. Maculloch informs us, (*Caled. Hort. Mem.* vol. i, p. 408,) is much cultivated in Guernsey and Jersey. The roots run sometimes four feet deep, and are rarely so small in circumference as six inches, having been known to reach sixteen. The leaves of this variety grow to a considerable height, and proceed from the whole crown of the root. The *Lisbonaise* does not extend to so great a depth as the *Coquaine*; but the root is equally good in quality, and what is lost in length is gained in thickness. The leaves are small and short, and only proceed from the center of the crown. The *Siam* has a root of a yellowish color, not very large, but tender, and more rich in taste than the other varieties."

Soil.—The soil should be light, deep, and free from stones. It should be dug or trenched before sowing, one good spade deep, at least, (some writers say two spades deep,) being careful to pulverize the soil thoroughly, that the roots may have no obstruction to prevent their running down long and straight. If the soil be proper for them, it is said they will not require much manure; and what is used should be perfectly decomposed, or, if recent, be deposited at the bottom of the trench. They do not impoverish the soil, but, like onions, may be raised many years in the same spot.

Seed estimate, and sowing.—Sow as early as the ground is thawed, if not too wet. Deane observed, that "some sow them in the fall; but that is not a good practice, because the ground will grow too close and stiff for want of stirring in the spring; which cannot well be performed in gardens, without danger of injuring the roots. And weeds will be more apt to abound among them if they be sown in autumn." Loudon says, "For a bed five feet by twenty, the plants to remain thinned to eight inches' distance, half an ounce of seed is the usual proportion." Deane recommends sowing them in rows across beds, fifteen inches apart, and to allow six inches from plant to plant at the last thinning, which may be early, as they are not often hurt by insects.

Culture.—When the plants are about one, two, or three inches high, in May or June, let them be thinned and cleared from weeds either by hand or small hoeing. Keep them afterwards clear from weeds, till the leaves cover the ground, after which no further culture will be required. Parsneps will continue growing till the frosts are very severe, and are not good for use till they have become ripe, late in autumn. Any thing which is to be used early in the season may be sown with parsneps, such as carrots to draw young, radishes, lettuces, &c.

Preserving during winter.—The parsnep is not so liable as the carrot to be hurt by frost if left in the ground, and some let them remain where they grew through winter. But the best way is to dig them some time in November. They should not be wounded nor bruised in digging; neither should the tops be cut off very close to the roots, nor any of the lateral roots cut off. In either case the roots will rot or become bitter. "Many lose their parsneps, or make them sprout, by putting them in a warm cellar. It is better to keep them in some out-house, or in a cellar that freezes; for no degree of frost ever hurts them. But to prevent their drying too much, it is best to cover them with dry sods, or else bury them in sand that has no moisture in it. Beach sand is improper, because the salt in it will make them vegetate."—*Deane.*

Field culture of parsneps.—In giving an account of the agriculture of the island of Jersey, an English writer says, "Parsneps are grown by every farmer, and either by the spade culture alone, by the plow and spade, or by the small and great plow; any soil in good heart and tilth suits them, but peculiarly a deep loam; and in the same spot, generally, are raised beans, peas, cabbage, and, occasionally, potatoes.

"When the plowing or digging is completed, the field is once harrowed; straight lines are then drawn across, by means of a gardener's rake, usually from north to south; women then proceed with dibbles, and set the beans in rows, at a distance of four inches, or five inches, from bean to bean, in four three, and sometimes two ranks of beans, leaving intervals of between five and six feet between each of the sown rows. In the use of the dibble, and in dropping the beans, the women have acquired considerable dexterity. In many instances they are followed by children, who drop into each hole made by the dibble, after the bean, three or four peas; the parsnep seed is then sown at the rate of one third to one half of a bushel to the acre."—*Quayle's General View of the Norman Islands.*

Use.—The writer above quoted asserts, that, in the island of Jersey, parsnep "is eaten with meat, with milk, and with butter; but not, as is the common mode of using it as human food in England, with salt fish, or, as in Ireland, together with potatoes.

"The next most valuable application of this root is hog-feeding. At first it is given to the animal in a raw state, afterwards boiled or steamed, and, finally, for a week or fortnight, with bean and oat-meal. A hog treated in this way is sufficiently fatted for killing in about six weeks. Its flesh is held superior to that arising from any other food, and does not waste in boiling.

"Bullocks are also fatted with parsneps in about three months; their flesh is here considered of superior flavor to any other beef, and commands, on that account, an additional half-penny in the pound on the price. To milch cows they are also usually given; on this diet, the cream assumes a yellow color. By the accounts here given, it appears, in proportion to the milk, to be more abundant, than when the animal is kept on any other food whatever. When the cow receives at the rate of thirty-five pounds per day, with hay, seven quarts, ale measure, of the milk, produce seventeen ounces of butter. It is generally allowed that the flavor of the butter is superior to any other produced in winter.

"Geese are sometimes shut up with the hogs to fatten on parsneps, which they will eat raw. The root is also given boiled; and for a week before killing they are fed with oats or barley only. Horses eat this root greedily; but in this island it is never given them, as it is alleged that, fed on this food, their eyes are injured. About Morlais, horses are not only ordinarily fed on parsneps, but they are considered as the best of all food, superior even to oats."

To save seed.—Transplant some of the best roots as early as the frost will permit in the spring, two feet asunder inserted over the crown. They will produce seed plentifully in autumn

PEAS.

Pisum sativum—*Pois*, Fr.—*Erbse*, Ger.

The pea is a hardy annual, a native of the south of Europe, cultivated in Great Britain from time immemorial, and in this country from its first settlement.

Varieties.—These are numerous: those mentioned in Mr. Russell's Catalogue are—

Early Washington, or true May Pea, (*extra early and fine—grows to the height of two and a half feet;*)
Early double-blossomed, frame, (*early and fine—three feet;*)
Early frame, (*two and a half feet;*)
Early golden Hotspur (*three feet;*)
Early Charlton, (*three feet;*)
Dwarf blue imperial, (*two feet—a superior variety;*)
Dwarf blue Prussian, (*two and a half feet;*)
Dwarf Spanish, or fan, (*one foot;*)
Dwarf marrowfat, (*three and a half feet;*)
Dwarf sugar, (*pods eaten—three feet;*)
Matchless, or true tall marrowfat, (*six feet;*)
Knight's tall marrows;
Tall, crooked podded sugar, (*pods eaten—six feet;*)
Ladies' finger marrows, (*a prodigious bearer, and delicate eating pea;*)
New nonpareil pea, (*a new and productive sort from Scotland;*)
Knight's dwarf marrows.

"The Charltons are not only very early, but great bearers, and excellent peas for the table; and are therefore equally well fitted for the early and forward succession crops, and inferior to few even for the main summer crops. The frame pea may indeed be raised without the assistance of heat for a forward crop, and, if a genuine sort, will fruit a few days sooner than the Charlton; but it grows low, and bears scantily. The Hotspur is hardy and prolific, and makes returns nearly as quick as the Charlton, and about a fortnight before the marrowfat. The sorts already specified, therefore, embrace the best for sowings made from the end of October till the middle of January, and for late crops, raised between the middle of June and the beginning of August. The Charltons and Hotspur may be sown in May for late fall crops; in June for a smaller supply; and in July along with the frames for the last returns."—*Loudon.*

Times of sowing.—"The dwarfs are generally employed in hot-bed culture, which, however, succeeds badly, and is neither worth preserving nor describing, and the less so, as early crops may be more certainly had by sowing in the fall, in sheltered situations, and covering during the winter with a layer of leaves, and another of long stable-litter loosely applied to keep the leaves in their places. After the earth takes a temperature favorable to vegetation, your pea sowings should be made once a fortnight, to keep up a regular and successive supply."—*Armstrong.*

Quantity of seed.—" Of the small, early kinds, one pint will sow a row of twenty yards; for the larger sorts, for main crops, the same measure will sow a row of thirty-three yards."

Process in sowing.—" For early sorts, make the drills one inch and a half deep; and let parallel drills be two feet and a half, three or four feet asunder. Peas that are to grow without sticks require the least room. For summer crops and large sorts, make the drills two inches deep, and four, five or six feet asunder. As to the distances along the drill, distribute the peas according to their size, and the season; the frame, three in the space of an inch; the Charltons, Hotspur, and dwarf marrowfat, two in an inch; the Prussian blue, and middle-sized sorts, three in two inches; the large marrowfat and Knight's, a full inch apart; the moratto, rouncivals, and most larger sorts, an inch and a half apart, and the Patagonian, two inches."

Soil and situation.—" The soil should be moderately rich, and the deeper and stronger for the lofty growers. Peas are not assisted, but hurt, by unreduced dung recently turned in. A fresh, sandy loam, or road-stuff, and a little decomposed vegetable matter, is the best manure. The soil for the early crops should be very dry, and rendered so, where the ground is moist, by mixing sand with the earth of the drills."—*Loudon.*

Armstrong says. " A loose and warm soil is most favorable to this vegetable, which, by the way, is neither improved in quality nor quantity by stable manure. The soil of Clichy, and of Point de Jour des Colombe, &c., in the neighborhood of Paris, is a pure sand, principally devoted to pea crops, and yielding these most abundantly without the application of dung, new or old."

Subsequent culture.—" As the plants rise from half an inch high to two or three inches, begin to draw earth to the stems, doing this when the ground is in a dry state, and earthing gradually higher as the stems ascend. At the same time, with the hoe, loosen the ground between the young plants, and cut down rising weeds. Early crops should be protected during hard frosts by dry straw, or other light litter, laid upon sticks or brush wood; but remove the covering as soon as the weather turns mild. If, in April, May, and the course of the summer, dry weather occurs, watering will be necessary, especially to plants in blossom, and swelling the fruit; and this trouble will be repaid in the produce. Rows partly cut off may be made up by transplanting. In dry weather, water, and in hot weather, shade, until the plants strike. All peas fruit better for sticking, and continue longer productive, especially the larger sorts. Stick the plants, when from six to twelve inches high, as soon as they begin to vine. Provide branchy sticks of such a height as the sort will require; for the frame and Leadman's dwarf, three feet high; for the Charlton and middle-sized, four or five feet; for the marrowfat and larger kinds, six or eight feet; for the rouncival, and for Knight's marrow-pea, nine or ten feet. Place a row of sticks to each line of peas, on the most sunny side, east or south, that the attraction of the sun may incline the plants towards the sticks. Place about half the number on the opposite side, and let both rows stand rather wider at top than at the ground. Some gardeners stop the leading shoot of the most early crop, when in blossom; a device which accelerates the setting and maturity of the fruit.

To forward an early crop.—"Sow or plant in lines from east to west, and stick a row of spruce-fir [or other evergreen] branches along the north side of every row, and sloping so as to bend over the plants, at one foot or eighteen inches from the ground. As the plants advance in height, vary the position of the branches, so as they may always protect them from perpendicular cold or rain, and yet leave them open to the full influence of the spring sun. Some cover during nights, and in severe weather with two boards, nailed together lengthwise, at right-angles, which forms a very secure and easily-managed covering, but excludes light. A better plan would be to glaze one of the sides, to be kept to the south, and to manage such row-glass, as they might be called, when over peas, beans, spinage, &c., as hand-glasses are managed, when over cauliflower; that is, to take them off in fine weather, or raise them constantly or occasionally by brick-bats, or other props, as the weather and the state of the crop might require."—*Loudon.*

Management of a late crop.—The best variety for this purpose is Knight's marrow-pea, which may be sown at intervals of ten days, from the beginning to the end of June. "The ground is dug over in the usual way, and the spaces to be occupied by the future rows of peas are well soaked with water. The mould upon each side is then collected so as to form ridges seven or eight inches above the previous level of the ground, and these ridges are well watered. These seeds are now sown in single rows, along the tops of the ridges. The plants grow vigorously, owing to the depth of soil and abundant moisture. If dry weather at any time set in, water is applied profusely once a week. In this way, the plants continue green and vigorous, resisting mildew, and yielding fruit till subdued by frost."—*Hort. Trans.* vol. ii.

To save seed.—"Like other vegetables, the pea is susceptible of considerable improvement, and by the simple means of marking the finest plants of each variety, and keeping them for seed. Wilson's frame, and the Knight pea, have been formed in this way, and afford sufficient proof of the *wonders* produced by a very small degree of observation and care."—*Armstrong.*

Field-culture of the pea.—The most common mode of sowing peas is broadcast; but the advantages of the row-culture, in a crop so early committed to the ground, must be obvious. Loudon says: "In Kent, where immense quantities of peas are raised, both for gathering green, and for selling ripe to seedsmen, they are generally sown in rows from eighteen inches to three feet asunder, according to the kind, and well cultivated between. Peas, laid a foot below the surface, will vegetate; but the most approved depth is six inches in light soil, and four inches in clay soil, for which reason they ought to be sown under furrow, when the plowing is delayed till spring. Of all grain, beans excepted, they are in the least danger of being buried too deep."

Deane observed, that for "Field-peas, land that is newly plowed out of sward is generally accounted best; and land which is high and dry, and has not been much dunged. A light, loamy soil is most suitable for them; and if it abound with slaty stones, it is the better. But they will do in any dry soil. The manures that suit peas best, are marl and lime. Our farmers do not commonly allow a sufficient quantity of seed for peas, in broad-cast sowing. When peas are sowed thin, the plants will lie on the ground, and perhaps rot: when they are thick, the plants will hold each other up with their tendrils, forming a continued web, and will have more benefit of the air.

Insects and diseases.—The *Mass. Agricultural Repository*, for June, 1822, contains some remarks of the Hon. T. Pickering, relative to a bug or fly (*bruchus pisi*), which preys on the pea, in which he observes, that an effectual remedy for this evil is *late sowing;* but the hot sun of June will so pinch the vines of the late sown peas, that the crop will be small, unless the land be moist as well as rich. He then details some experiments, by which he concludes that this insect is limited to a certain period for depositing its eggs; and if the tender pods are not found till that period has passed, the peas will be free from bugs. Col Worthington, of Rensselaer county, N. Y., "sowed his peas on the 10th of June, six years in succession, and a bug has never been seen in his peas. Whereas his neighbors, who have not adopted this practice, have scarcely a pea without a bug in it. He supposes the season for depositing the egg of the pea-bug is passed before the peas are in flower."—*Mem. of N. Y. Board of Agriculture*, vol. ii, p. 23. "The only insect that commonly injures our peas is a small brown bug or fly, the egg [or larva] of which is deposited in them when they are young and the pods easily perforated. The insect does not come out of its nest till he is furnished with short wings. They diminish the peas in which they lodge nearly one half, and their leavings are fit only for the food of swine. The bugs, however, will be all gone out if you keep them till the following autumn. But they who eat buggy peas the winter after they are raised, must run the venture of eating the insects."—*Deane's N. E. Farmer*. The same writer recommends, when seed-peas are known or suspected to contain insects, to scald them a quarter of a minute in boiling water, spread them about, and sow them without delay. If any of the bugs should be in the peas, this scalding will destroy them; and the peas, instead of being hurt, will come up the sooner, and grow the faster.

Mildew is another evil attending peas, especially such as are sown late in the season. This disorder is supposed by Knight to be caused by "a *want* of a sufficient supply of moisture from the soil, with *excess* of humidity in the air, particularly if the plants be exposed to a temperature below that to which they have been accustomed." The remedy which he recommends is, to "give water rather profusely once a week, or nine days, even if the weather proves showery."—See *N. E. Farmer*, vol. i, p. 414.

Use.—The use of peas for soups, and other culinary purposes, is well known. They are likewise very serviceable in fattening hogs, for which purpose they should be harvested dry, and ground into meal. If the straw be forward in autumn, and has been harvested without injury, it will be little inferior to ordinary hay for feeding cattle.

"In boiling split peas, some samples, without reference to variety, fall or moulder down freely into pulp, while others continue to maintain their form. The former are called *boilers.* This property of boiling depends on the soil: stiff land, or sandy land that has been limed or marled, uniformly produces peas that will not melt in boiling, no matter what the variety may be."—*Loudon.*

"When peas are sown before winter, or early in spring, they are very apt to be eaten by mice. To prevent this, soak the peas, for a day or two in train oil, before you sow them, which will encourage their vegetation and render them so obnoxious to mice that they will not eat them."—*Domestic Encyclopedia.*

PEPPER, RED.

Capsicum.—*Piment* Fr.—*Spanischer Pfeffer*, Ger.

This plant requires a warm, rich soil, and a favorable exposure. The seeds may be placed in rows, three feet apart, or in hills, at that distance from each other. In dry weather they will need watering, and should be kept clear of weeds by frequent hoeing. The seeds are best preserved by running a string through the pods, and hanging them in a dry place.

Use.—"Pepper is an excellent spice, which should always be coarsely ground, and eaten only with fat, smoked, or tough animal food; with cabbages, cucumbers, and other flatulent and cold vegetables; and likewise with fish, and all substances that are difficult to be digested. On the continent of Europe, this spice is highly esteemed for its efficacy in relieving flatulency, weak, or impaired digestion, and the giddiness which generally accompanies the complaint last mentioned. For this purpose, from six to ten grains are directed to be swallowed every morning, previously to taking food; such practices, however, ought to be adopted only in cases where the stomach is in a high degree vitiated, or the patient has been habituated to the free use of spices and spirituous liquors."—*Dom. Encyc.*

POTATO.

Solanum Tuberosum.—*Pomme de Terre*, Fr.—*Kartoffel*, Gei

Sir Joseph Banks (*Hort. Trans.* i, 8), considers that the potato was first brought to Spain from the mountainous parts of South America, in the neighborhood of Quito. To England, however, this root found its way by a different route, being brought from Virginia by the colonists sent out by Sir Walter Raleigh, in 1586.

Varieties.—These are very numerous, not only from the facility of procuring new sorts by raising them from seed, but because any variety cultivated for a few years, in the same soil and situation, as in the same garden or farm, acquires a peculiarity of character and habit, which distinguishes it from the same variety in a different soil and situation. Dr. Hunter, in his *Georgical Essays*, has supposed the duration of a variety is limited to fourteen years: and Knight concurs with him in opinion. Potatoes, which are excellent in Ireland, Nova Scotia, and other high northern latitudes, do not answer a good purpose in New England. The potato taken from the south prospers better, such as the River Plate, or long red potato, which has succeeded well in Massachusetts. Loudon asserts, that the best mode to order potatoes for seed is, to give a general description of the size, color, form, and quality wanted, and whether for an early or late crop, without being guided by the names attached to any varieties.

Propagation.—The potato may be propagated from seed, cuttings, or layers of the green shoots, sprouts from the eyes of the tubers [roots], or portions of the tubers containing a bud or eye, or by planting the tubers whole. The object of the first method is to procure a new or improved variety; of the second, little more than curiosity, or to multiply, as quickly as possible, a rare sort; and of the third, to save the tubers for food. The methods, by portions of the tubers [the roots cut in pieces], or whole potatoes, are the best, and almost universally practiced, for the general purposes both of field and garden culture.

By seed.—"Take the apples, in the beginning of October [or whenever they are ripe], before the frost has hurt them; hang them up by the foot stalks, in a dry closet, where they will not freeze; let them hang till March, or April; then mash the apples, wash the seeds from the pulp, and dry them in a sunny window. Sow the seeds in a bed about the first of May. When the plants are four or five inches high, transplant them into ground well prepared, one or two plants in a hill."—*Deane.* Seeds from the same ball will produce a great variety of kinds, some of which may be of little value; and in order to make the most of such experiments, it will be well to proceed according to the following directions, extracted from some remarks by Col.

Pickering, contained in a pamphlet published by the Essex Agricultural Society, Mass.; this society having awarded premiums for the best potatoes raised from the seed.

1. "Seeing the seeds in the same ball will produce various sorts of potatoes, it will be indispensably necessary, that each young plant grow at the distance of eight or ten inches apart.

2. "In autumn, or as soon as the vines or stems of the plants die, and the young potatoes are dug up, those of each plant are to be saved by themselves, and it will be easy to put each sort in a separate paper bag. Those potatoes will be very small, perhaps from the size of a pigeon's down to a sparrow's egg.

3. "In the ensuing spring, the potatoes of each sort, that is, the potatoes of each bag, must be planted by themselves, and, if not in distinct rows, then stakes, driven into the ground, should mark the divisions of the several sorts in the same rows, leaving a space of about two feet between one sort and another, to guard against any mixture.

4. "In the time for harvesting them in the second year, the potatoes [if grown in a good soil] will be large enough to be boiled, to ascertain their quality. Each sort must be tried by itself. Such as are watery, and are ill-flavored, may be at once thrown aside, for the use of live stock. Every other sort, so valuable as to be thought worth cultivating, must be kept unmixed, by putting each kind in a separate bag or cask."—*N. E. Farmer*, vol. vi, p. 286.

The modes of propagating by layers, cuttings of the vines, suckers, sprouts, &c., are rather curious than useful, and are therefore here omitted, but may be seen in detail in the *Encyc. of Gard.* p. 620.

By portions of the tubers [or cuttings of the roots].—"In making the sets or sections, reject the extreme or watery end of the tuber, as apt to run too much to haulm [vine], and having the eyes small, and in a cluster; reject also the root, or dry end, as more likely to be tardy in growth, and produce the curl. Then divide the middle of the potato, so as to have not more than one good eye in each set. When the potato-scoop [an instrument for digging out the eyes of potatoes] is used, take care to apply it so as the eye or bud may be in the center of each set, which this instrument produces, of a semi-globular form. The larger the portion of tuber left to each eye, so much the greater will be the progress of the young plants."—*Loudon.*

By some experiments which were made by J. Whitlaw, Esq., and given in detail in the *N. E. Farmer*, vol. i, p. 53, and vol. iv, p. 314, these two important facts were made apparent: 1st. Large potatoes are much better for seed than small ones. 2d. It is best to cut off the but and top-ends from each potato, and cut the middle pieces into quarters, before planting Knight, the famous English horticulturist, has found, that, for a late crop, small *sets* [seed potatoes] may be used; because the plants of the late varieties always acquire considerable age before they begin to generate tubers; but for an early crop, he recommends the largest tubers; and he has found, that these not only afford very strong plants, but also such as readily recover when injured by frost; for, being fed by a copious reservoir beneath the soil, a reproduction of vigorous stems and foliage soon takes place, when those first produced are destroyed by frost or other cause. He adds, "When the planter is anxious to obtain a crop within the least possible time, he will find the position, in which the tubers are placed to vegetate, by no means a point of indifference; for these, being shoots or branches which have grown thick instead of elongating, retain the disposition of branches to propel the sap to their leading buds, or points most distant from the stems of the plants of which they once formed parts If the tubers be placed with their leading buds upwards, a few very strong and very early shoots will spring from them; but if their position be reversed, many weaker and later shoots will be produced; and not only the earliness, but the quality of the produce, in size, will be much affected."—*Hort. Trans.* iv, p. 448.

M'Mahon advises to cut seed potatoes "a week before planting, in order that the wounds should have time to form a dry crust; for, if planted immediately after being cut, they imbibe too much moisture, many of them rot, and the rest are greatly weakened thereby." Some advise to wet seed potatoes, and roll them in pulverized plaster of Paris, immediately before planting.

From an experiment made by a person in the employ of the Hon. Josiah Quincy, the particulars of which are given in *Mass. Agr. Repos.* vol. v, p. 64, it appears that the product of certain rows, planted with *whole* potatoes, exceeded an equal extent of adjoining rows *more than one third.* A writer for the *N. E. Farmer*, vol. i, p. 330, gives an experiment, which tends to the conclusion that potatoes planted whole produce more than those which are cut. The experiments of most cultivators, however, are in favor of cutting. Dr. Cooper, in the last Philadelphia edition of *Willich's Domestic Encyclopedia*, says, "The best mode [with regard to seed potatoes] appears to be this:—Choose your potatoes for planting of a moderate size, rather large than small, for there is no good reason to be assigned for breeding from diminutive parents; cut your potatoes into sets, two eyes to a set; throw away, without hesitation, into the hog-trough all the inferior and diminutive eyes, choosing your sets from the middle of the potato; do not cut the potato down the middle." Loudon observes, "In preparing the sets of potatoes, some cultivators recommend large sets, others small potatoes entire. Others, on the ground of experience, are equally strenuous in support of small cuttings, sprouts, shoots, or even only the eyes or buds. With all these different sorts of sets, good crops are stated to have been raised, though tolerable-sized cuttings of pretty large potatoes, with two or three good eyes or buds in each, are probably to be preferred. A very slight exercise of common sense might have saved the advocates of shoots, scooped-out eyes, &c., their experiments and arguments, it being evident, as Brown has observed, to every one that has any practical knowledge of the nature of vegetables, that the strength of the stem in the outset depends, in direct proportion, upon the vigor and power of the set. The set, therefore, ought to be large, rarely smaller than the fourth part of the potato, and if the root is of small size, one half of the potato may be profitably used. At all events, rather err in giving over-large sets, than in making them too small; because, by the first error, no great loss can be sustained, whereas, by the other, a feeble and late crop may be the consequence." Deane says, "The shooting parts exist in a potato in the form of a tree, of which the stock is at the but or root-end. I therefore take care to cut athwart those parts as little as possible; though they will grow any way, the greater length of shooting stem there is in a set, the more strong and vigorous will be its growth at first."

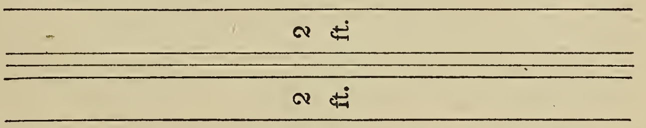
Quantity of sets.—Abercrombie directs, for a plot of the *early* and *secondary crops*, eight feet wide by sixteen in length, planted in rows, fifteen inches asunder by nine inches in the row, a quarter of a peck of roots or cuttings. For *full-timed* and *main crops*, a compartment, twelve feet wide by thirty-two in length, planted in rows two feet distant, half a peck. For *field cultivation*, English writers say that it requires twenty bushels and a half to plant an acre with cut potatoes, and thirty-seven bushels and a quarter of whole potatoes

Soil.—"The soil," says Loudon, "in which the potato thrives best, is a light loam, neither too dry nor too moist, but if rich, so much the better. They may, however, be grown well on many other sorts of land, especially those of the mossy, moory, and other similar kinds where they are free from stagnant moisture. The best flavored potatoes are almost always produced from a newly broken-up pasture-ground, not manured, or from any new soil, as the site of a grubbed-up copse or hedge, or the site of old buildings or roads. The best climate for the potato is one rather moist than dry, and temperate or cool rather than hot. Hence the excellence of the Irish potatoes, which grow in a dry, loamy, calcareous soil, and moist and temperate climate; and hence, also, the inferiority of the potatoes of France, Spain, Italy, and even Germany. In short, the potato is grown no where in the world to the same degree of perfection as in Ireland and Lancashire, and not even in the south of England, so well as in Scotland and the north and western counties; all which is, in our opinion, clearly attributable to the climate."

Although a *light* loam is a proper soil for the potato in a cool and moist climate, a strong and *heavy* loam is most suitable for the same root in a dry and hot climate. In a paper read before the New York Horticultural Society, in 1823, by William Wilson, an experienced horticulturist, are the following remarks on this subject:—"Those soils which prove the very bane of the potato here [in the United States] are just such as prove the most congenial for it in Britain. And so, on the contrary, the best soils by far for producing the driest and best flavored potatoes here, and altogether the most abundant crops, are those of a strong, heavy loam." These assertions are corroborated by a number of experiments, mentioned in the paper from which they are extracted. Mr. Buel, of Albany, likewise asserts that "the best potatoes are grown upon cold, moist, but porous and rich soils."—*Am Farmer*, vol. ix, p. 409.

Methods of planting.—These are various. If the land is rough, hard, or stony, the common mode of planting in hills is, perhaps, the most expedient. But if it be somewhat mellow, drills are to be preferred. Dr. Cooper says, "If your soil is stiff and wet, plow it in ridges; if sandy and dry, plow it flat. Plow it deep. Plant your sets in drills marked out by the plow or the hoe. The plants should be dibbled in, six inches deep, on long dung, scattered not sparingly along the drills, then covered with about four inches of mould.

The drills should be in threes ≡ one foot apart; the plants should be eight inches apart, with an interval on each side of each set of three drills of two feet, which will admit of horse-hoeing between the sets of drills, and of hand-weeding between each drill.



To have a good crop, you must not spare dung, or spare labor in weeding. Some persons prefer sets of four or five drills instead of three, or, where horse-hoeing is not convenient, the intervals may be reduced to one foot between each set of drills, for the convenience of hand-weeding; but, upon the whole, the method here first proposed is as good as any. Forty loads of dung per acre will pay better than a less quantity.

"If small potatoes are wanted for feeding, the sets may be at six inches apart, and the rows at nine inches; but the method first here proposed admits, what is essential, accurate weeding, and sufficient air to circulate between the plants."

Deane says, the sets may be either in single rows, three feet, or double, one foot apart, and from seven to nine inches asunder in the rows.

"An expeditious way of planting potatoes is as follows:—After the ground is prepared, by plowing and harrowing, cut furrows with the horse-plow forty inches apart; drop the sets in the furrows; then pass the plow along the back of each furrow, which will throw the earth of both furrows upon the sets; and afterwards level the ground with the back of the harrow, or with a harrow that has short tines; but it is of no great consequence whether it be leveled at all. Another method of planting is, to plow the ground plain, keeping the furrows straight and regular, and drop sets in every third or fourth furrow. But before this is done, the ground should be plowed and made level and fine with the harrow."

A writer for the *N. E. Farmer*, vol. ii, p. 331, gives the following as "an easy and cheap method of raising potatoes:—On an even and smooth piece of mowing, or pasture land, make deep, single furrows, with a plow, at three feet distance Fill these furrows with rye [or any other] straw, and drop your potatoes six or eight inches apart on the straw. Then, with a hoe, cover the potatoes by turning down the plowed furrows upon them. They will require no more attention till they are grown. No hoeing will be necessary. The same land may be improved as a pasture for sheep, as those animals will not eat, nor materially injure the tops of the potatoes."

The *after-culture* of potatoes consists in harrowing, hoeing, weeding, and earthing up. All potatoes require to be earthed up; that is, to have at least one inch in depth of earth heaped on their roots, and extending six or eight inches round their stem. The reason is, that the tubers do not, properly speaking, grow under the soil, but rather *on*, or just partially *bedded* in its surface. Potatoes should, generally, be hoed three times, though twice will do in ground not infested with weeds. The last hoeing should be finished before the plants are in blossom; otherwise the plants will be apt to form a second set of roots, which will not have time to come to maturity, but will rob those first formed of their nourishment. If weeds are prevalent, they should be cut up or pulled out, but the plants should not be earthed up in that stage of their growth. Plaster of Paris, well pulverized, and applied to the leaves, has a beneficial effect on potatoes.

Pinching off the blossoms.—It is now generally admitted, that a certain advantage, in point of produce, is obtained by pinching off the blossoms as they appear on the plants. The fact has been repeatedly proved, and satisfactorily accounted for, by Knight, who imagines that it will add an ounce in weight to the tubers of each plant, or considerably above a ton per acre.

Gathering the crop.—It is believed that cultivators are apt to err by gathering their potatoes too early. The roots continue to grow larger and better after the tops have attained their full growth. The Hon. O. Fiske, of Worcester, in an address to the Worcester Agricultural Society, says, "Nature has not accomplished its maturation at the period when the vines decay, and the farmer believes it to be ripe. It seems probable that the earth, by some unknown process, perfects its qualities after it has attained its growth. That potatoes which have remained the whole season in the earth are more farinaceous, has been ascertained." It may be stated, as a general rule, that potatoes succeed best when planted early and dug late. But it is more advisable to harvest them before the occurrence of those soaking rains which generally precede the setting in of winter.

A mode of taking part of a crop is mentioned :—' Having ascertained that some of the tubers have attained an eatable size, go along the rows, and loosen the earth about each plant with a blunt stick, taking two or three of the largest tubers from each, and returning the earth carefully."

The most expeditious way of gathering a potato crop is, first to run furrows on each side of the rows, and then a deep one in the middle, which turns up most of the roots to the surface, for the purpose of picking up by hand. In this way, however, we should apprehend some waste, and should not advise it, except where potatoes are plenty, and labor scarce. A hoe with prongs, such as is sold at the agricultural warehouses generally, is, probably, the best implement for gathering potatoes.

Securing the crop.—Mr. Buel, of Albany, says, " There are many erroneous notions, in regard to the culture and treatment of the potato, which every class in society have an interest in exploding, as the root has become a necessary food for every family." These errors consist in supposing " 1st That potatoes should be grown on a dry, warm soil. 2d. That they should be dried in the sun, or washed, to render them pleasant to the eye. 3d. That they should be kept warm and dry during winter, to fit them for culinary uses. 4th. That they should be of large size." In contradiction to these popular opinions, he asserts, " *First*, that the best potatoes are grown upon cold, moist, but porous and rich soils. *Second*, that it were better the sun never should shine upon them—that they should be housed with all the dirt that adheres to them—that it is beneficial to add more dirt in the bin or cask, to exclude external air as much as possible. And, *third*, that their surface should be kept moist, and the atmosphere, which surrounds, as little above the point of freezing as possible."

Potatoes may be kept during winter in a cellar, free from frost, or in pits or caves in the field. In the latter case, they must be so situated on a dry knoll, or the side of a hill, as to be secured from the possibility of the pits being pervaded by water; and they must be so covered, first with straw and then with loam, as to prevent the intrusion of frost. They may, likewise, be placed in barrels, casks, or boxes, and if packed in moist sand, or the loam of the field in which they grew, they will be preserved better than in almost any other situation. If they are exposed to the sun and air till the upper side acquires a green color, they become poisonous.

Use.—The use of the potato, as an article of diet both for man and beast, is probably more extensive, and more common, than that of any other vegetable production. From having no peculiarity of taste, and consisting chiefly of starch, it approaches near to the qualities of the flour of grain ; " and for this reason," says Loudon, " it is the most universally liked, and can be used longer in constant succession by the same individual without becoming unpalatable, than any other vegetable, the seeds of grasses excepted." Neill observes, "so generally is it relished, and so nutritious is it accounted, that, on many tables, it now appears almost every day in the year."

An Essay on the *Solanum Tuberosum*, by H. C. Worsham, from the *Philadelphia Journal of the Medical and Physical Sciences*, gives the following summary view of the excellent qualities of this superlative root:—"Having its origin in a warm climate, it was supposed to be intolerant of cold, and upon that account incapable of cultivation in a more northern clime. But experience has shown the contrary, and the potato is naturalized almost in every region. With the lower classes of people, it is one of the greatest blessings which the soil produces, forming 'flour without a mill, and bread without an oven;' and, at all seasons of the year, an agreeable, wholesome dish, without expensive condiments. What resources does the potato present to us? Its stalk, considered as a textile plant, furnishes in Austria a sort of flax—when burned, it yields much potash—its apples, when ripe and crushed, ferment, and give spirits by distillation—its tubercles, made into a pulp, are a substitute for soap, in bleaching. Cooked by steam, the potato is a most healthy food. By different manipulations it furnishes two kinds of flour, a gruel and a parenchyma, which may be applied to increase the bulk of bread made from grain. Treated chemically, it is converted into beer, vinegar, spirits, &c."

PUMPKIN.

Cucurbita pepo.—*Courge*, Fr.—*Kürbis*, Ger.

The pumpkin is a native of India. Loudon says there are six species in cultivation, but gives no description of them. Russell's Catalogue enumerates the following varieties:

- Finest yellow family pumpkin,
- Connecticut field,
- Large cheese,
- Mammoth, (*which have grown to* 226 *lbs. weight,*)
- Seven years, (*a fine sort to keep.*)

Pumpkins will grow on any kind of soil, which is proper for head-crops, but the land cannot be made too rich for them. The *Farmer's Assistant* thinks they will grow better, when planted by themselves, than when raised, as usual, with Indian corn. The hills, in such case, should stand about seven feet apart each way, and a number of seeds should be planted in each hill, to make allowance for what may be destroyed by insects. It will be well, however, to protect them by frames, covered by gauze, as directed p. 56, under the article Cucumber.

Preservation.—Pumpkins may be kept in a cellar, for this purpose, a considerable part of the winter; but the cellar must not be too warm; and care must be taken not to break off the stems, but leave these attached to them; otherwise they will soon commence rotting, at the places where the stems were broken off.—*Farmer's Assistant.* They may likewise be preserved in mows of hay or straw or in any dry situation, in which they are secure from frost.

Use.—Loudon says of the pumpkin, "Though commonly cultivated in gardens for curiosity, yet, in some of the country villages in England, the inhabitants grow it on dunghills, at the backs of their houses, and train the shoots to a great length over grass. When the fruit is ripe, they cut a hole in one side, and, having taken out the seeds, fill the void space with sliced apples, adding a little sugar and spice, and then, having baked the whole, eat it with butter.—*Neill.* Pumpkin-pie, Abercrombie says, is very common [in Great Britain, and proverbially so in New England.] On the continent the fruit is a good deal used in soups, and also stewed and fried in oil and butter." Its culinary uses in the United States are too well known to need description; but some may not be aware that "Pumpkins are excellent for fattening horses. They, however, do not relish them at first; and therefore must be kept from feeding till they are hungry, before the pumpkins are offered to them, and let a little salt be first sprinkled on this food; when they will soon grow fond of it, and eat it readily without salt."

RADISH.

Raphanus sativus.—*Rave*, Fr.—*Rettig*, Ger.

The garden-radish is a native of China, and introduced into England in 1584.

Varieties.—Mr. Russell's Catalogue contains the following:—

Early short-top scarlet, (*a superior sort*),
Early frame,
Long white summer, or Naples,
Purple-short top,
Long salmon,
Cherry, or scarlet turnip-rooted,
White turnip-rooted,
Violet-colored turnip-rooted,
Black fall, or Spanish.

Propagation.—All the varieties are raised from seed.

Soil and situation.—The soil should be light and mellow, well broken by digging. A scattering of the smaller growing sorts may be sown among some broad-cast crops of larger growth, such as spinage, lettuce and onion; it may also be drilled between wide rows of beans, or on ground intended to be sown with a late spring crop.

Times of sowing.—"To have a constant succession of radishes at table, the seeds should be sowed once a fortnight, from April [or the last of March] to August. But in midsummer they sooner grow sticky and strong, than in spring or fall. They must therefore be eaten while they are young. I have had better success with those sown in August than in any other month."—*Deane.*

Seed, process in sowing, and common culture.—"Sow each sort separately; and for a bed four feet six inches by twelve feet, two ounces of seed will be required for the spring sorts, and an ounce and a half for the autumn varieties. All the kinds may be sown either broad-cast or in drills; but the latter is preferable, as allowing the roots to be drawn regularly, with less waste. If you sow broad-cast, it is a good method to make beds four or five feet wide, with alleys between, a foot wide, the earth of which may be used to raise the beds, or not, as the season may make it desirable to keep the beds dry or moist. Avoid sowing excessively thick, as it tends to make the tops run, and the roots stringy. Rake in the seed well, full half an inch deep, leaving none on the surface to attract birds. If you trace drills, let them be, for the spindle-rooted kinds, half an inch deep, and about two inches and a half asunder; for the small turnip-rooted, three quarters of an inch deep, and four or five inches asunder; and for the black turnip or Spanish, six or eight inches asunder, because the root grows to the size of a middle-sized turnip. As the plants advance in growth, thin them so as to leave the spindle-rooted about two inches square distance, and the other sorts three, four, or five, leaving the most space to the respective sorts in free, growing weather. In dry, warm weather, water pretty frequently: this swells the roots, and makes them mild and crisp."—*Abercrombie.*

"This root being liable to be eaten by worms, the following method is recommended for raising them:—Take equal quantities of buck-wheat bran, and fresh horse-dung, and mix them well and plentifully in the ground by digging. Suddenly after this a great fermentation will be produced, and numbers of toad-stools will start up in forty-eight hours. Dig the ground over again, and sow the seed, and the radishes will grow with great rapidity, and be free from the attack of insects. Buck-wheat bran is an excellent manure of itself."—*Farmer's Assistant.*

Use.—"Formerly the leaves were often boiled and eaten; but now the roots are generally employed. These are eaten raw in spring, summer, autumn, and winter. The young seedling leaves are often used with cresses and mustard, as small salad; and radish-seed pods, when of plump growth, but still young and green, are used to increase the variety of vegetable pickles, and are considered a tolerable substitute for capers."—*Loudon.*

"Radishes are esteemed aperient, attenuating, and anti-scorbutic: when eaten in moderate quantities, they are in a certain measure salubrious to persons of strong habits; but are, in general, apt to produce a considerable degree of flatulency in those whose stomachs are relaxed. No radishes, how ever, ought to be eaten when *old*, or after having been kept some time, as they are then utterly indigestible, and render the breath very offensive."—*Dom. Encyc.*

Dr. Cooper observes, that "Radishes ought to be sown in rich ground, and carefully tended, so as to grow quickly; if not, they become stringy, in which state they are very unwholesome and indigestible."

Seed.—"Radishes that are for seed require much room, as they grow to a large size. For this purpose some of the most thrifty ones should be left standing; or else be transplanted to a place where each shall have as much room as nearly a yard square. The ripeness of the seed is known by the pods turning brown. For this purpose the seeds must be sown early in the spring, because they ripen slowly."—*Deane.*

For forcing radishes, hot-beds, and culture proper for hot-bed productions should be resorted to. See *Encyc. of Gard.* p. 596.

RHUBARB.

Rheum.—*Rubarbe*, Fr.—*Rubarber*, Ger.

There are three species of this plant in cultivation—the *R. rhaponticum*, a native of Asia; *R. hybridum*, also a native of Asia, and *R. palmatum*, a native of Tartary, distinguished by its elegant palmate leaves, and considered as the true Turkey or Russia rhubarb.

Propagation and culture.—"All the sorts may be raised either from seed or dividing the roots. If from seed, which is the best mode, sow in light, deep earth, in spring; and the plants, if kept eight or nine inches asunder, will be fit for transplanting in autumn, and for the next spring. When the roots are divided, care must be taken to retain a bud on the crown of each section: they may be planted where they are finally to remain. When a plantation is to be made, the ground, which should be light and rather sandy, but well manured, should be trenched three spits, or as deep as the sub-soil will admit, adding a manuring of well rotted hot-bed dung. Then plant in rows, three feet wide by two feet, in the rows for the *R. rhaponticum* and *palatum*, and five feet by three feet in the rows for the *R. hybridum*. No other culture is required than keeping the ground free from weeds, occasionally stirring it, during summer, with a three-pronged fork, and adding a dressing of well rotted manure every autumn or spring, stirring the ground as deep as possible. Some never allow the flower-stalks to produce flowers; and others cut them over as soon as they are done flowering, to prevent the plants from being exhausted by the production of seeds. The former seems the preferable method, as the flower stalks of the plants cannot, like the leaves, be considered as preparing a reserve of nourishment for the roots.

Blanching.—" The advantages of blanching the stalks of rhubarb, for culinary purposes, have been pointed out by T. Hare, Esq.—*Hort. Trans.* vol. ii. 'These are two-fold, namely, the desirable qualities of improved appearance and flavor, and a saving in the quantity of sugar necessary to render it agreeable to the palate, since the leaf-stalks, when blanched, are infinitely less harsh than those grown under the full influence of light, in an open situation.' It may either be blanched by earthing up the roots early in spring, or earthen pots may be used, as in blanching sea-kale.

Taking the stalks.—" Remove a little earth, and, bending down the leaf you would remove, slip it off from the crown without breaking, or using the knife. The stalks are fit to use, when the leaf is half expanded; but a larger produce is obtained by letting them remain till in full expansion, as is practiced by the market-gardeners. The stalks are tied in bundles of a dozen and upwards, and thus exposed for sale.

To save seed.—" Leave one or two of the strongest flower-stalks to perfect their seeds, which they will do in July and August.

Use.—" The two first species are cultivated entirely, and the third, in gardens, principally, for the petioles of the root-leaves, which are peeled, cut down, and formed into tarts and pies in the manner of apples and gooseberries. The *R. hybridum* affords the most abundant and succulent supply for this purpose."—*Loudon.*

RUE.

Ruta graveolens.—*Rue*, Fr.—*Rante*, Ger.

This is an under-shrub, an evergreen, which prefers a light soil, and is easily propagated by cuttings or seeds. Mr. Armstrong says, " its beauty is much increased by lopping the branches close to the earth every fourth year."

Use.—Boerhaave recommends the leaves of rue as of great service to persons of cold, phlegmatic habits; as they quicken the circulation, dissolve viscid or tenacious juices, remove obstructions, and promote the fluid secretions Mr. Wilson, in his *Economy of the Kitchen Garden*, says, " The most effectual remedy for expelling worms, that has ever come under my observation, was effected by an infusion of the tops of rue, given in gin to the patient, in the morning, fasting."

SAGE.

Salvia officinalis.—*Sauge*, Fr.—*Salbey*, Ger.

Sage is a native of the south of Europe. Its varieties are—

The red,
The broad-leafed, or balsamic,
The green,
The small-leafed green, or sage of virtue

Estimate of sorts.—" The red is the principal sort in culinary use, having the most agreeable and the fullest flavor; the green is next in estimation with the cook; but the small-leaved is generally preferred to those to eat as a raw herb, and for decoctions; while the broad-leafed, balsamic species, is the most efficacious in a medical way, and is also a tea-herb. However, any of the sorts may be occasionally used for these alternate purposes.

Culture.—" They are all propagated alike, by seeds or suckers, and by portions of old roots, and grow well in any soil not positively wet. Till three or four years old, they have a healthy and agreeable appearance, forming full and regular tufts; but, after this period, they lose the central branches, and even become ragged and broken at the edges. The treatment already suggested for rue might be useful for sage. Under it, the roots would probably renew their vigor, and throw out new and healthy shoots; but of this theory we have no experience."—*Armstrong.*

Use.—" The leaves are used in stuffings and sauces, for many kinds of luscious and strong meats, as well as to improve the flavor of various articles of cookery. The decoction called sage-tea is usually made from one variety, the small-leaved green, or sage of virtue; but any of the others are equally fit for this purpose."—*Loudon.*

SALSIFY, *or* OYSTER PLANT.

Tragopogon porrifolius.—*Salsifis*, Fr.

The salsify is a hardy biennial, a native of England. The root is long and tapering, of a fleshy white substance; the herb smooth, glaucous, and rising three or four feet high. The leaves resemble those of the leek; the flowers are of a dull purple color, closing soon after mid-day; the seed, as in other species of goat's beard, is remarkable for having attached to it a broad feathery crown.

Culture.—" It resembles a small parsnep in its appearance. It is raised annually from seeds, and as easily, requiring no more care than the carrot It bears a tolerable crop.

Use.—" In this country it is parboiled, and then fried either in batter or without. It forms an admirable garnish for boiled fowls or turkeys. In its taste it so strongly resembles the oyster, that, when sliced and fried in batter, it can scarcely be distinguished from it. If our gardeners would introduce it into the market, and our citizens once try it, there would be no danger of its ever failing hereafter to be raised. It is in eating from November to May, precisely the period in which our vegetable market is most deficient in variety."—*John Lowell, Esq., in Mass. Agr. Repos.*

" The stalks of the tragopogon may be cut in the spring, when they are four or five inches high, and dressed like asparagus, in which they eat very tender and well."—*Rees' Cyclopedia.*

SAVORY.

Satureja.

Two species of this plant are cultivated—the *winter* and *summer* savory

Winter savory is a hardy under-shrub, a native of the south of France and Italy. The shoots are furnished with two narrow, stiff leaves, an inch long, placed opposite at each joint, and from the base of these a few small leaves proceed in clusters. It produces whitish flowers in May and June.

Summer savory is a hardy annual, a native of Italy. The branches are slender, erect, and about a foot high; leaves opposite, and almost an inch in length. It flowers in June and July.

Culture.—Winter savory is a perennial plant, and is propagated from seeds or slips; summer savory, from seeds only. Both sorts will grow on almost any soil, and it is said that the winter kind grows best on barren soils.

Use.—" Both the summer and winter savory have long been cultivated for culinary and medicinal purposes. Their warm, aromatic, pungent leaves are much esteemed in salads: formerly, they were employed medicinally, with a view to attenuate viscid humors, to dispel flatulency, and to increase the appetite According to Professor Bradley, this herb, when dry, and put into a bed, possesses the remarkably property of expelling fleas."—*Dom. Encyc.*

SEA-KALE.

Cramba maritima.—Chou Marin, Fr.—*Meerkohl*, Ger.

The sea-kale grows spontaneously on many parts of the sea-coast of Great Britain. The inhabitants watch when the shoots begin to push up the sand and gravel, in March and April, when they cut off the young shoots and leaf-stocks, then blanched and tender, and boil them as greens.

Use.—"The young spring shoots and the stalks of the unfolding leaves, blanched by rising through the natural ground in a wild state, or by earthing up in gardens, are the parts used; and, when boiled, and dressed like asparagus, are not inferior to that vegetable. They form also an excellent ingredient in soups. Sometimes the ribs of the large leaves are peeled and dressed as asparagus, after the plant has ceased to send up young growths. By forcing, sea-kale may be had in perfection from November till May, a period including all the dead months of the year. It is remarked by Nicol, that vegetables are seldom improved by forcing, but that sea-kale forms an exception, the forced shoots produced at mid-winter being more crisp and delicate in flavor than those procured in the natural way, in April or May. Sir George Mackenzie, (*Caled. Hort. M m.* vol. i, 313,) observes, that sea-kale cannot easily be overdone in cooking, and that, after being well boiled, it should be thoroughly drained, and then suffered to remain a few minutes before the fire, that a further portion of moisture may be exhaled."—*Loudon.*

John Lowell, Esq., in a communication, published in the *Mass. Agr. Journal*, says, "It is very hardy—grows in any tolerable soil—is perennial, and costs not half the labor bestowed on asparagus. It may be raised from the seed or from the root, and fifty plants, occupying a very small space, will supply a single family. In its taste it resembles the cauliflower. The only labor it requires, is, to cover it with sand or earth, or with pots or boxes in March, so as to exclude the light, and to blanch it, or make it white. If not blanched, it is neither so beautiful to the eye, nor so tender, nor so delicate to the taste, as if blanched. It should be thoroughly boiled, and is better if boiled in milk and water. It should be served up like cauliflowers, with melted butter. It comes in at a season in which our vegetables in this country are very deficient."

Mr. Armstrong says, "In November, whether your bed has been filled with plants or with seedlings, be careful to cover them with a thick coat of well-rotted dung, and so soon in the spring or summer as you find them pushing through this covering, put over each a garden-pot inverted, having first stopped the bottom holes. The signal for cutting is when the plants have arisen about three inches above the surface."

SKIRRET.

Sium sisarum.—*Chervis*, Fr.—*Zuckerwurzel*, Ger.

"The skirret is a perennial tap-rooted plant, a native of China. The lower leaves are pinnated, and the stem rises about a foot high, terminated by an umbel of white flowers, in July and August. The root is composed of fleshy tubers, about the size of the little finger, and joined together at the crown or head: they were formerly much esteemed in cookery. In the north of Scotland, the plant is cultivated under the name of *crummock.*

"*Culture.*—This plant grows freely in a lightish soil, moderately good. It is propagated both from seed, and by offsets of established roots. The better method is, to raise seedlings, to have the root in perfection, young and tender.

"*By seed.*—'Sow between the 21st of March and the 15th of April; a fortnight later, rather than any earlier, for a full crop, as plants raised forward in spring are apt to start for seed in summer. Sow on an open compartment of light ground, in small drills eight inches apart. When the plants are one two inches high, thin them to five or six inches asunder. They will enlarge in growth till the end of autumn; but before the roots are full grown, in August, September, or October, some may be taken up for consumption as wanted: those left to reach maturity will continue good for use throughout winter, and in spring, till the stems run.'

"*By slips*—'Having some plants of last year's raising, furnished with root-offsets, slip them off; taking only the young outward slips, and not leaving any of the larger old roots adhering to the detached offsets; which plant by dibble, in rows from six to nine inches asunder. They will soon strike, and enlarge, and divide into offsets; which, as well as the main roots, are eatable, and come in for use in proper season.'

"*To save seed.*—Leave some old plants in the spring; they will shoot up stalks, and ripen seed in autumn."—*Loudon.*

"*Use.*—The tubers are boiled, served up with butter, and are declared by Worlidge, in 1682, to be 'the sweetest, whitest, and most pleasant of roots.'"—*Loudon.* The common skirret has an agreeable aromatic flavor, and abounds with saccharine particles: hence it has been conjectured that sugar might be advantageously extracted from the root; and M. Margraff states, that he obtained one ounce and a half of pure sugar from half a pound of this vegetable. In a medicinal view, it possesses diuretic properties, and is in a slight degree stimulant.—*Dom. Encyc.*

SPINACH, *or* SPINAGE.

Spinacia oleracea.—*Epinard*, Fr.—*Spinat*, Ger.

The common spinage is an annual plant, but it is not known of what country it is a native. The leaves are large, the stems hollow branching, and, when allowed to produce flowers, rising from two to three feet high. The male and female flowers are produced on different plants: the former come in long terminal spikes; the latter in clusters, close to the stalk at every joint.

Varieties.—Russell's Catalogue contains the following:—

Round-leaved, or summer;
Prickly, or fall;
English patience dock, *rumex patientia, (for early greens;)*
Holland or lamb's quarter;
New Zealand, *tetragona expansis, (a valuable new sort.)*

Times of sowing.—"The round is sown in April—the others from August to September. The prickly is sown in August and September for early spring greens."—*Russell's Catalogue.*

Soil and situation.—As the excellence of *spinaceous* plants consists in the succulency of the leaves, almost every thing depends on giving them a rich soil, stirring it frequently, and supplying water in dry seasons The space they occupy in the garden is not considerable, say a thirtieth part; more especially as some of them, the common spinage for example, often come in as a temporary crop between rows of peas or beans, or among cauliflowers, broccoli, &c.

Seed and process in sowing.—"When raised by itself, spinage is generally sown broad-cast, and two ounces will sow a bed four feet and a half by thirty feet; but in drills, one ounce will sow the same space. In drills it is easier to weed and gather: let the drills be from nine to twelve inches apart. Beds four feet wide, with small alleys, are convenient of access. Let the ground be thoroughly dug. Whether broad-cast or in drills, sow thinly, and rake or earth in about an inch deep.

Subsequent culture.—"When the plants are up, showing leaves about an inch broad, clear them from weeds, either by hand or small hoeing, and thin the plants, where crowded (especially the broad-cast crops), to three inches apart; and, when advanced in growth, every other may be cut out for use, increasing the distance to about six inches, that the remainder may grow stocky, with large spreading leaves. The plants of the early and succession crops attain proper growth for gathering in April, May and June. When the leaves are from two to five inches in breadth, cut the plants clean out to the bottom, or sometimes cut only the largest leaves. But as soon as there is any appearance of their running to seed, they may be drawn out clean as wanted."

To save seed.—"To obtain seed of the round-leaved, leave a sufficient quantity of established plants in April, May, or June, to run up in stalks; or transplant in autumn some of the spring-sown which have not run. To save seed of the triangular spinage, transplant, in March, some good strong plants, of the winter crop. For large supplies, a portion of each may be sown in February, or the first fortnight of March, to stand wholly for seeding. Sow each sort separate. Respecting both sides, observe that they are of the class *Diœcia*, the male and female flowers growing separately, on two distinct plants. When the plants are flowering for seed, the cultivator should examine whether the male plants, distinguishable by the abundant farina upon the blossoms, stand crowded or numerous to excess; in which case he should pull up the superfluous plants, leaving a competency for fertilizing the female blossoms, which else would prove abortive. And when the female blossoms are set, it is best to dispose of all the male plants, drawing them by hand; which will give more room to the females to grow and perfect their seed. The plants rejected may be profitably given to young pigs. The seed ripens in July and August."—*Abercrombie.*

Use—"The leaves are used in soups, or boiled alone, and mashed, and served up with gravies, butter, and hard-boiled eggs. The leaves may be obtained from sowings in the open ground at most seasons of the year, but chiefly in spring, when they are largest and most succulent."—*Loudon.* "According to the opinion of French physicians, this plant is not only food, but physic, and is hence emphatically called '*Le balai de l'estomac*'—the broom of the stomach—sweeping and deterging every hole and corner of that organ, without giving pain, or in any degree interrupting the ordinary avocations of the persons employing it."—*Armstrong.*

SQUASH.

Cucurbita melo pepo.—*Courge ou Potiron*, Fr.

The squash is a species of the *cucurbita*, and seems to be the link which connects the melon and pumpkin.

"*The varieties* mentioned in Russell's Catalogue are—

Early bush summer;
Long crook-neck, or bell;
Vegetable marrow;
Acorn;
Commodore Valparaiso, (*grows large, and is highly esteemed;*)
Canada crook-neck; (*small, and of superior quality.*)

"Squashes, of every kind, may be cultivated as directed for cucumbers and melons—should be sown at the same time, and at similar distances, with this difference, that two plants of these will be plenty for each hill, and that they are easier pleased with soil and preparation than the others."—*M'Mahon.*

Use.—The squash is applicable to all the uses of the pumpkin, and, for many purposes, is superior to that vegetable.

STRAWBERRY.

Fragaria.—*Fraisier*, Fr.—*Erdbeerpflanze*, Ger.

The substance of the following article was written for this work, at the particular request of its compiler, by a gentleman of Boston, whose success, as a practical, is equal to his skill as a scientific horticulturist; and whose liberality in imparting his knowledge, as well as the results of its successful application in introducing excellent varieties of fruits, merits the thanks of the community.

Varieties.—Every year is producing new varieties of this as well as almost all other fruits, from the care and attention which are bestowed on them by the scientific cultivators of Europe, among whom, at the present day, Mr. Knight, the president of the London Horticultural Society, seems to take the lead.

Society owes much to these gentlemen, and they are constantly receiving the reward of their labors from the many and continued testimonies of approbation, which their success calls forth. But their chief gratification is derived from the pursuit itself, which, above all others, is calculated to soothe and tranquillize the mind, and to lead men to "look through Nature up to Nature's God."

The kind most esteemed in England are the pine, imperial, Bostock, Surinam, Bath scarlet, Downton, roseberry, Hudson Bay, large scarlet, musk hautbois, round hautbois, and flat hautbois.

In France, the Bath scarlet is of long standing, and much esteemed. The white, the Alpine, or monthly, and the Chili, are also favorites.

The *Chili* is a shy bearer, but very large when it comes to maturity—is not, I believe, known here: it stands on a stiff, upright, and strong stem, in lieu of a pendulous one, like the Hudson.

The *Downton* is, however, I believe, a larger strawberry, and is uncommonly high flavored. There are other new varieties very large, of which I know nothing. The form of the Downton is various; many of them are shaped like a cock's comb, which name it has obtained in some horticultural works. It was raised from seed by Mr. Knight, at Downton, the name of his estate, and is a very good bearer.

The *roseberry* is, in point of flavor, surpassed by no cultivated strawberry I have seen. It resembles, in form and flavor, the Alpine, but is a better bearer. This last,

The *Alpine*, is a monthly strawberry ; it continues in bearing from June until October in this climate—is like the wood-strawberry in form and flavor, but is a shy bearer.

The *scarlets* are all large and fine fruit; the largest variety are fine flavored and very early. They are not very great bearers, but should be cultivated as valuable varieties, as well as for their beauty and excellent qualities.

The *hautbois* is the favorite English strawberry. It is totally different from what is commonly called the hautbois in this country. The flat hautbois grows generally on the top of the vines—is brown, and greenish white when ripe—fine flavored, pretty good bearer, but difficult to detach from its stalk.

The *round hautbois* is of a dark purple when ripe—is somewhat in form like the common red strawberry, but larger; and the

Musk hautbois is like the preceding—a shy bearer, but very delicious.

The *wood-strawberry* is far before any other in point of flavor, and, if transplanted into gardens, may for two or three years answer very well ; and it not too highly manured, preserve their flavor and increase their size. But new plants must be obtained, every two or three years, from the woods, to make new plantations, or they will degenerate.

Soil and manure.—The soil proper for this last mentioned variety, as well as all others, is light, warm, and gravelly ; and the manure to be applied should be exclusively vegetable, and not animal manure The usual practice is to manure the ground with rotten dung, with a view to increase the size and quantity of fruit ; but, in doing this, the flavor of the fruit is destroyed in proportion to the richness of the soil. Besides, high manuring produces strong vines and little fruit. Rotten leaves, decayed wood, ashes, in small quantity, mixed with other vegetable substances in a compost heap, will make better manure for strawberries than any animal substance whatever. As the vines which bear this fruit require great moisture to bring the fruit to its proper size, the soil and situation in which they are placed must not be too dry.

Propagation.—The usual time for transplanting strawberry-plants is August. That time is chosen because they have then done bearing, and have made offsets, if the season has been favorable, of strong plants, set from their runners. Plantations made at this season will bear some fruit the next summer. But, if you can get good vigorous plants in May of the preceding season, I prefer to plant then, as it saves a year, nearly, the plants being ready to bear abundantly the next year.

Gardeners have different habits and opinions as to trimming the plants when they are put out. Some cut off all the old leaves, and preserve only the *naissant* leaves in the center of the plant. Others take off the dead or decayed leaves only, and plant with all the old healthy leaves on the plant. This last plan is highly recommended by the Abbé Rozier, but, so far as my experience goes, I have found the first mentioned course best. Many people cut the roots in before they put them into the ground: all dead substances should be cut off, but not the roots. When the plants are put out, they should be kept free from weeds, and the ground should be kept loose about them. If the plants are strong, put but one to form the stools; if weak, put two.

As regards the distance at which plants should be set, cultivators differ. The common red strawberry, which is found in all our gardens, may be put eight inches apart in rows nine inches or a foot from each other, and allowed to form a matted bed of eighteen inches or two feet wide, with a foot-path of a foot wide between them. But the larger and finer sorts should be planted in stools in beds four and a half feet wide, with a path of fifteen inches or more between the beds. In these beds the plants should be set, by a line, fifteen to eighteen inches apart, both ways, taking care to set them in quincuncial order, and to keep them from running together.

The objection generally made to this mode of cultivation is, that the fruit is exposed to be injured by lying on the ground, where it is bruised and covered with dirt every time it rains. This, however, may be prevented by a little care. In some parts of Europe, where moss is plenty, it is collected and put round the stools, so as to prevent the fruit from lying on the ground and at the same time to prevent the moisture round the plant from evaporating.

In some places, where moss is not to be got, straw is used for the same purpose; hence the English name of strawberry.* But I think that leaves of trees that have been collected in the spring, and kept under cover, are better than either, and particularly the oak-leaf; because, when they are no longer wanted to protect the fruit, and keep the moisture in the ground, they can be dug in round the stools, where they serve as most excellent manure for this delicious fruit.

The strawberry may also be propagated by seed. Knight, in making experiments, with a view of ascertaining whether most of the sorts would not breed together indiscriminately, raised above four hundred varieties, "some very bad, but the greater part tolerably good, and a few very excellent." The fruit of above a dozen sorts was sent to the Horticultural Society [in London] in August, 1818, and found of various degrees of excellence. The seeds, if sown immediately after gathering, will produce plants which will come into bearing the following year.—*Loudon.*

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* This name is common in all the northern countries, while in France, and countries south, it is said they take their name from their flavor, or the botanical name *fragaria.*

"*Use.*—The fruit is fragrant, (whence *fragaria,*) delicious, and universally esteemed. It consists almost entirely of matter soluble in the stomach, and neither there nor when laid in heaps, and left to rot, does it undergo the acetous fermentation. Hence it is very nourishing, and may be safely eaten by gouty and rheumatic persons. 'In addition to its grateful flavor, the subacid juice has a cooling quality, particularly acceptable in summer. Eaten either alone, or with sugar and cream, there are few constitutions with which strawberries, even when taken in large quantities, are found to disagree. Further, they have properties which render them, in most conditions of the animal frame, positively salutary; and physicians concur in placing them in their small catalogue of pleasant remedies. They dissolve the tartareous incrustations of the teeth. They promote perspiration. Persons afflicted with the gout have found relief from using them very largely; so have patients in cases of the stone; and Hoffman states, that he has known consumptive people cured by them. The bark of the root is astringent.'—*Abercrombie.*"—*Loudon.*

SUNFLOWER.

Helianthus annuus.

This plant is a native of South America, but naturalized and become common in the United States. It is easily propagated in any common soil, either by sowing the seeds, or by slips or offsets from the roots.

From a paper on the subject of sunflower-oil, in the first vol. of *Trans. Amer. Phil. Society*, it appears that one bushel of seed yields three quarts of oil, and that this quantity of seed is produced from one hundred plants, set about three feet apart, in the same manner that Indian corn is planted. The oil is thin, clear, and of an agreeable taste.

The process for expressing the oil is the same as that of making linseed-oil.

TANSY.

Tanacetum Vulgare.—*Tanaise*, Fr.—*Rheinfarn*, Ger.

Tansy is a perennial plant, which grows without cultivation in Great Britain and in some parts of the United States.

Culture.—Tansy may be propagated in spring or autumn by rooted slips, or by dividing the roots into several sets. Plant them in any compartment of the kitchen or physic garden, from twelve to eighteen inches asunder. The plant continues for several years, producing abundant tufts of leaves annually. As they run up in strong stalks in summer, these should be cut down to encourage a production of young leaves below on the stem. To have young tansy in winter, plant some roots either in a hot-bed or in pots placed therein, or in a pinery or forcing house, at any time from November to March.—*Abercrombie.*

Use.—"The young leaves are shredded down, and employed to give color and flavor to puddings; they are also used in omelets and other cakes, and were formerly in much repute as a vermifuge."—*Loudon*

TARRAGON.

Artemisia Dracunculus.—*L'Estragon*, Fr.—*Dragun*, Ger.

Culture.—This is a perennial plant, which may be propagated from seed, or from slips or offsets, in the same manner that tansy, mint, &c., are cultivated.

Use.—"Tarragon is frequently used in salads, especially by the French, to correct the coldness of other herbs. The leaves make an excellent pickle; they have a fragrant smell and aromatic taste. The use of them in Persia has ever been general, at meals, to create an appetite. The famous vinegar of Maille, in France, owes its superior flavor to this plant, which is now common in Pennsylvania."—*Dr. Mease.*

THYME.

Thymus Vulgaris.—*Thym*, Fr.—*Thimian*, Ger.

There are, according to Loudon, two species of thyme cultivated for culinary purposes—the *common* and the *lemon* thyme.

Common or *garden thyme* is a native of Spain and Italy. Of this there are two varieties, the broad and the narrow-leaved, besides the variegated, grown for ornament.

Lemon thyme—*T. citriodorus*—is a very low evergreen shrub, trailing and seldom rising above four or six inches in height. It is distinguished by its strong smell of lemon.

Culture.—The plant is best raised from seed. Sow as early in the spring as the season will permit, in a bed or border of light, fine earth, either broad-cast, scattered thin, and raked in lightly, or in small, shallow drills, six inches asunder. The after-culture is simple, and similar to that of other sweet herbs, such as marjoram, sage, &c. "In soils which are cold, stiff or moist, it does not thrive; its branches become ragged, its leaves few, and its flowers, and their peculiar aroma, feeble and faded."—*Armstrong.*

Use.—"The young leaves and tops are used in soups, stuffings, and sauces. For these purposes, the broad-leaved common is generally preferred; but the flavor of the yellow is much liked in peculiar dishes."—*Loudon.* "All the parts of this plant, but particularly the calyx of its flower, yields an essential oil, yellow and odorous, and highly charged with camphor. In the kitchen, it is used as an ingredient in sauces and stuffings, and in what are technically called *forced meats.*"—*Armstrong.*

TOMATO.

Solanum Lycopersicum.—*Tomate*, Fr.—*Liebes Apfil*, Ger.

"This plant is of the same family with the potato, and, like it, is a native of Southern America. It has several species, two of which fall under our notice as garden vegetables, and are distinguished from each other only by a difference of size. The smaller is held to be the parent plant, and has the advantage of ripening sooner, and better resisting cold weather. To have an early crop, sow the seeds in a dry and warm soil, and sheltered situation, in October, and cover the bed with straw or stable-litter during the winter. For summer and fall use, sow again in May, and water freely. If the soil and situation be favorable, and the culture proper, the product will be great The distance between the plants should not be less than two feet."—*Armstrong.*

Use.—"When ripe, the fruit, which has an acid flavor, is put into soups and sauces, and the juice is preserved for winter use, like ketchup; it is also used in confectionery as a preserve, and, when green, as a pickle. Though a good deal used in England in soups, and as a principal ingredient in a well-known sauce for mutton, yet our estimation and uses of the fruit are nothing to those of the French and Italians, and especially the latter. Near Rome and Naples, whole fields are covered with it; and scarcely a dinner is served up, in which it does not, in some way or other, form a part."—*Loudon.*

TURNIP.

Brassica Rapa.—*Navet*, Fr.—*Steckrübe*, Ger.

Russell's Catalogue contains the following *varieties:*—

Early white Dutch,
Early garden stone,
White flat, or globe,
Green round,
Red round,
Swan's egg,
Large English Norfolk,
Long tankard, or Hanover,
Long yellow French,
Yellow Dutch,
Yellow Maltese,
Yellow Aberdeen,
Yellow stone,
Yellow Swedish, Russia, or ruta baga,
Dedham.

The first three sorts are fittest for early, first succession, and main crops. The French turnip, according to Loudon, is of excellent flavor, and is in high repute in France, Germany, and Holland. The Swedish, for its large size and hardy nature, is extensively cultivated in fields for cattle; it is also occasionally raised in gardens for the table, to use in winter and spring.

Seed estimate.—For a seed-bed four feet and a half by twenty-four, the plants to remain and be thinned to seven inches' distance, half an ounce.

Time of sowing.—Make first a small sowing of some of the early sorts in the last fortnight of March or the first days of April, for turnips in May and June; but, as these will run to seed the same season, make a larger sowing about the middle of April. The first considerable sowing may be about the middle or towards the end of May, for roots to draw young about the end of June, and in full growth in July and August. The principal sowing should be about the middle of July. "Doing it on a set day is ridiculous; for a time should be chosen when the ground has the right degree of moisture to make the seed vegetate; and if this should happen a week earlier or a fortnight later than the usual time, it need not be regretted; but the opportunity ought to be embraced."—*Abercrombie.* They may be sown to advantage in New England as late as the first week in August; and those which are put into the ground so late will be less liable to be injured by insects than when sown earlier.

Soil and situation.—Sand or gravel, with a mixture of loam, produce the sweetest and best flavored roots. It should be made fine, but not too rich, lest the turnips be rank and ill tasted. Ground which has been newly cleared from the forest yields the largest and sweetest roots, and on such spots there is least danger from insects. "Next to new land, swarded ground is to be chosen for a crop of turnips; and the way to prepare it is, to plow it pretty deep in the spring, and fold it by turning in the stock for a good number of nights; for there is scarcely any of our fields sufficiently rich to produce turnips without manuring; and folding hitherto appears to be the best method of enriching the ground for this purpose. It should be well harrowed, as often as once a week, while the folding is continued, to mix the excrements of the cattle with the soil."—*Deane.*

Process in sowing, and precautions against the fly.—"Let the ground be well broken by regular digging, and neatly leveled to receive the seed. Procure bright, well dried seed. At a season when the turnip-fly is not apprehended, the seed may be put into the ground without any preparation, either alone or mixed with a little sand; but in the hot weather of summer, it is advisable to use some cheap and effectual preventive of the fly. It appears from a trial of Knight, at the suggestion of Sir Humphrey Davy, that lime slaked with urine, and mixed with a treble quantity of soot, if sprinkled in with the seed at the time of sowing, will protect the seeds and germs from the ravages of this pernicious insect; but this antidote cannot be conveniently applied unless the sowing be in drills. A yet simpler remedy, found by Mean to be perfectly successful, is, to steep the seed in sulphur-water, putting an ounce of sulphur to a pint of water, which will be sufficient for soaking about three pounds of seed."—*Abercrombie.*

The method of sowing is either broad-cast or in drills. In the former mode, Abercrombie directs to allow half an ounce of seed for every one hundred square feet. Deane says, the quantity of seed for an acre is never less than one pound—more frequently a pound and a half, and sometimes two. In sowing by broad-cast, the seed may be covered by drawing a "light harrow backward, that is, wrong end foremost, to prevent the tines, which are generally set somewhat pointed forward, from tearing up the sods, and burying the seed too deep." If sowed in rows, the drills may be an inch deep, and twelve or fifteen inches asunder.

Subsequent culture.—As soon as the plants have rough leaves, about an inch broad, hoe and thin them to six or eight inches' distance, cutting up all weeds. As the turnips increase in the root, a part may be drawn young, by progressive thinnings, so as to leave those designed to reach a full size ultimately ten or twelve inches apart.

Taking and preserving the crop.—In England they feed the turnips off the ground with sheep, or draw them up for neat cattle. through the winter, as they are wanted; but, in this country, they must be harvested in autumn, about the end of October, or even earlier in some seasons and places, and stored and saved, as directed for preserving other roots. See page 24.

To save seed.—"Some of the best roots of the middling size should be planted early in the spring, in a good spot, free from shade. They should be in rows, eighteen inches asunder, and the ground must be kept clear of weeds till the seed is ripe. Stakes and laths may be needful round the outside, to keep the branches from falling to the ground before the seed is fully ripe."

—*Deane.* "It is preferable, however, to procure turnip-seed, as indeed that of most other vegetables, from the regular seedsmen; as the seed farmers have opportunities of keeping the sorts distinct, which cannot be within the precincts of a walled garden."—*Loudon.*

Use.—The common culinary uses of the turnip, boiled, mashed, &c., are too well known to need any notice. We shall mention some uses not so common.

"*For feeding horses.*—These, when fed on turnips, are induced to eat the barn-chaff, and other dry food, with a good appetite—are kept healthy, and will work without corn.

"*For feeding cows.*—To make sweet and well-tasted butter from the milk of cows fed on turnips, let the milk vessels be kept constantly clean and well scalded with boiling water, before using. When the milk is brought into the dairy, to every eight quarts mix one quart of boiling water; then put up the milk into the bowl to stand for cream.

"*As a substitute for bread.*—When the dearness of all sorts of corn occasioned many poor people in Essex [England] to make bread of turnips, they took the peeled roots and boiled them in water till they were soft; then, strongly pressing out their juices, they mixed them with their weight of wheat-meal; and adding salt, yeast, and warm water, they kneaded it up as other paste; which, having lain a little while to ferment, they ordered and baked as common bread."—*Gleanings in Husbandry.*

CALENDARIAL INDEX.

THE object of this Calendar is little more than to give brief intimations of work to be performed in a garden, together with some approximation to the time of year in which it should be accomplished. The figures refer to the pages in which further directions may be found relative to the operations adverted to. These directions are intended for the New England States, or about the latitude 42° N. and the vicinity, or a small elevation above the sea.

Allowance should be made for elevation of site, as well as for situation north or south of that degree. But it is not possible, perhaps, to state what that allowance should be with any approach to precision. The nature of the soil, the aspect, the exposure, the forwardness or backwardness, or what may be styled the general character of the season, are all to be regarded; and require the exercise of a sound discretion in the cultivator, not to be restricted by general rules, which are liable to too many exceptions to be noted in this work.

JANUARY.

Throughout New England the temperature of the climate is such as to exclude the cultivator from performing most of the operations of tillage or horticulture from about the first of December to the latter part of March, or the beginning of April. The seeds of knowledge may, however, be sown in winter, and the horticulturist may cultivate his mind when his soil is bound in frozen fetters.

Provide a sufficient quantity of bean-poles, and pea-rods, which you may preserve in a corner of your wood-house, or other place suitable for your urpose. Many people, who neglect to procure these implements in season, are induced, by the hurry of business, to permit their peas and beans to trail on the ground, in which situation they will not produce, especially the tall growing sorts, one third part so many as if they were properly supported by poles and rods. The length of the pea-rods should be in proportion to the sorts of peas for which you intend them, 83. The same kinds of rods, which the tall-growing peas require, will answer for the generality of running kidney beans. The Lima beans will need strong poles, from eight to nine feet high. You may now make preparation for forcing cucumbers and melons, 50, 66.

FEBRUARY.

Manure may be carried into those places where it is needed, left in a heap, but not spread. Wherever and whenever the snow is off the ground, rake together and burn the haulm, or whatever may remain from the last year's crop. Fences should be inspected and repaired, and seeds rubbed out and cleaned. Straw mats for the hot-beds, pales, rails, lattices, or trellises for espalier trees, should be got in readiness. See that your garden ools are in good repair, and procure such new ones as may be necessary It is now time to set about procuring and preparing materials for, and forming hot-beds. Clean trees from moss, and protect them against mice and rabbits by whitewashing with lime, or smearing with some composition which is offensive to those vermin. Enter in earnest into the business of forwarding various kinds of seedling plants, by artificial means, so that they can have strong roots, and arrive at some size by the time they would naturally make their first appearance above ground. This may well be done by adopting Mr. Armstrong's method with regard to melons, 64. Attend to your fruit in your fruit-room or cellar, on shelves or in boxes, and, it necessary, pick it over, and cull out whatever is defective; wipe the remainder dry, and pack it away anew. But if it is put down in some sort of grain, dry sand, flax-seed chaff, or, what is probably best of all, pulverized plaster of Paris, you will not need to meddle with it. You may now, perhaps, begin to force asparagus in hot-beds, 14. Sow under glass cases, for transplanting or otherwise, radishes, carrots, small salads, peas, beans, &c. Protect choice plants, which may show a disposition to vegetate, by matting, litter, cases of wicker, old bark, and other proper means.

MARCH.

Lettuce may be sowed in the open ground as soon as frost will permit, 62. It may be sowed between vacant rows, intended for other plants, and pulled out for use before the other plants are large enough to be encumbered by it. Early peas cannot be planted too soon after the ground is thawed, 82. Radishes may be sowed as soon as the seed can be raked in. Sow cabbages, cucumbers, melons, cauliflowers, squashes, &c. in hot-beds, under glasses, &c., 49, 61, 104. Dig up vacant ground, applying manure. Dress borders, and clip edgings of box. Clean, relay, or make new gravel walks. Attend to, and turn over compost beds. Dress asparagus beds, or make new ones the latter part of this month or the beginning of April, 14. Select from your cellar the best cabbages with heads, and set them in some proper place to stand for seed. Set the different kinds remote from each other, to prevent their mixing at the time of blossoming. Likewise, set some of your best cabbage stumps for early salad and greens If the ground is moist, set shallow; if dry, place them about six inches deep. Small salading, such as cresses, 48, mustard, 70, 71, radish, 95, &c., when a constant supply is wanted, should be sown once a week or fortnight. Celery for an early crop may be sown in this month, though the principal sowing had better be deferred till April, 43. Artichokes should be sowed as early as the season will permit, 12, and horse-radish.

APRIL.

In the Eastern States generally, and in those parts of the Middle States where the ground is naturally somewhat moist and heavy, this is the month for sowing the principal garden crops. Sow the hardy kinds as soil, site and season will permit, that the plants may be firmly established before they are overtaken by the heat and drought of summer. But a stiff and moist soil should never, on any account, be dug, plowed or harrowed when it is so wet as to be clammy and adhesive. On the other hand, a light, sandy soil will be meliorated by being hoed, or otherwise wrought on while moist.

"Earth of a consistence that will hold water longest *without becoming hard when dry*, is that of all others the best adapted for raising the generality of plants in the greatest perfection. The great art of improving sandy and clay soils is to give to the former such dressings of clay, cow-dung, and other kinds of manure, as will have a tendency to bind and make it more compact, and, consequently, more retentive of moisture; and, to the latter, coats of sandy earth, pond mud, horse dung," &c.—*M'Mahon.*

Sow artichokes, 11, asparagus, 14, horse, or garden beans, 17, kidney beans, 19, beets, 22, the last of this month, or the first of next, Borecole, 26, Brussels sprouts, 29; sow cabbage seed, 30, set out cabbage plants, 31, sow cardoons, 37, carrots, 38, cauliflowers, 41, celery, 43, coleworts, succession-crops of cresses, 48, cucumbers in hollowed turnips placed in a hot-bed, 53, or in pots under hand-glasses, &c.; propagate fruit-trees by cuttings. You may set out a few dandelion plants in your garden, 57, and let us know how you succeed in attempting to domesticate them. Look out for, and destroy insects; sow a little early summer endive, 58, fennel, 59; propagate garlic, leeks, 60, lettuce, 61, marjoram, onions, 72, parsley, 78, parsnep, 79, successive crops of different sorts of peas, 82, potatoes, 87, radish, 95, sage, 99, salsify, 99, savory, 100, sea-kale, 101, skirret, 102.

MAY.

You may now sow most or all the articles mentioned in the Calendar for the last month, either as first or succession-crops. Plant your cucumbers, 49, and melons, 63, for a general crop in the open ground about the 20th; also, squashes, pumpkins, and gourds; likewise Indian corn for an early garden crop. Plant your bush-beans and pole-beans, for your principal crop, at any time when most convenient during the month, 17. It is recommended to set the poles, and then plant the beans round the poles. Weed and thin your advancing crops of radishes, 95. Transplant radishes for seed, 95. Sow succession-crops of spinach, 103. Carrots may be sown in the Eastern States in the forepart of the month, 38. Weed and thin beets, carrots, parsneps, onions, early turnips. Sow more turnips of the early kinds for crops in succession. Such sowing is best performed in the first week of the month, in order that the roots may have time to grow to a good size before they are overtaken by summer heat and drought. Early cauliflower plants, as they advance in growth, should have earth drawn up about their stems, and be watered in dry weather. You will do well to sow peas for succession-crops, at least twice this month, 82. You may set out or transplant early lettuce. Sow as many of the sorts of small salading as you may need for market or family consumption. Now is, perhaps, as proper a time as any in the year for pruning fruit-trees. The season for pruning is immediately before, or commensurate with, the rising of the sap. Let your ducks have constant employment as *vermin pickers*. Attack insects by sprinkling over them, by means of a syringe, watering-pot, or garden engine, simple water, soap suds, decoctions of tobacco, of elder, &c. &c.

JUNE.

Melons and cucumbers, which have hitherto been protected by glasses or paper frames, may now be exposed to the open air. If the season be at all dry, your vegetables, particularly your cucumbers, will need water. [See

Introduction.] Be careful to keep your crops clean, by hand-weeding and hoeing. About the last of the month, you may sow crops of melons and cucumbers for pickling. Thin forward melon plants, leaving only two or three in a hill, 65. Attend to your cabbage and cauliflower plants, as well as your beans, &c., and see that they are not destroyed by the cut worm. "If you perceive any plants injured, open the earth at the foot of the plant, and you will never fail to find the worm at the root, within four inches. Kill him, and you will save not only the other plants of your garden, but probably many thousands in future years." Hoe and bush your late peas; plant more potatoes, succession-crops of kidney beans, 19, peas, 82, small salads and lettuce every week or ten days. "Thin out and earth up all your plants; remember that frequent hoeing is both rain and manure to your vegetables in dry weather." Celery plants may now be planted out in trenches, 43. When the plants have grown to the height of eight or ten inches, draw earth about them, breaking it fine. This should be done in dry weather, being careful not to bury the heart. Plant out cabbages, cauliflowers, broccoli, &c., in moist or cloudy weather, but not when the ground is wet and heavy. Cut and dry such herbs as have come to maturity, for winter use. You may as well dry and pulverize some kinds, if you choose. Look over your grafted trees, and you may ascertain whether the scion has united with the stock. Take off the clay, and loosen the bandages of such grafts as have succeeded, and tie weak grafts and dangling shoots from budded stocks to neat stakes. Rub off all superfluous, irregular, or ill placed shoots or suckers. Where your fruit trees appear to be overloaded with fruit, pick off a part, and carefully gather all that which has fallen and give to your swine, in order to destroy the curculio.

JULY.

Clean and prepare your ground where your early crops of peas, spinage, cauliflowers, and cabbages grew, and all other vacant spots, to cultivate thereon such plants as are proper to supply your table, in autumn and winter, with later-grown productions. You may continue to sow crops of small salading every eight or ten days, as directed in former months; but they should now be sown on shady borders, or else be shaded by mats, occasionally, from the mid-day sun, and frequently watered, both before and after the plants appear above ground. You may now plant out your celery plants in trenches, 43, unless you have already performed that operation, as directed last month. About the middle of July, and from that time to the end of the first week in August, you may sow turnips, 111. Thin and transplant such lettuces as were sown last month, and sow more lettuce-seed in the beginning, middle, and last week of this month, in order to have a constant supply for the table, 61. Sow likewise radishes, 95, and in the last week of this month a good crop of spinach may be sown for autumn use; it will not then be so liable to run to seed as in the preceding months. It is a good practice to sow early kinds of cabbages, 30, about this time, for a supply of young greens during autumn. Collect all kinds of seeds as they come to maturity, cutting off or pulling up the stems with the seeds attached, as they ripen. Spread them in some airy place under cover, turning them now and then, that the seeds may dry and harden gradually, and be careful not to lay them so thick as to hazard their heating and fermenting. When they are sufficiently dry, beat out and clean the seeds, and deposit them in bags or boxes till wanted. Give water to such plants as require it, but let this be always done in the evening, that it may be of use to the vegetables before the sun shall cause it to evaporate.

You may now inoculate or bud your fruit-trees, and, where it can be done without inconvenience, it will be well to turn swine into your orchard to eat the fallen and decayed fruit, and thus destroy the insects which it contains. If, however, this cannot well be done, or you have not swine in sufficient numbers to devour all your fallen fruit, it will be well to gather and carry it from the ground before the insects, which inhabit it, make their way into the earth, and make you destructive visitations another season.

AUGUST.

Keep all your crops clear from weeds, using the hoe where safe and convenient; otherwise make claw-hoes of your hands, and weed-extracting nippers of your thumb and fore-fingers. Pull up the haulm of peas, beans, &c., and remove it to your compost bed; bury it between rows of plants, or throw it, together with all weeds, &c., to your swine, that your premises may have a neat appearance. Cut such herbs as are now in flower, to distill, or to dry for winter use, being careful to do it when they are dry, and spread them in a dry, shady place; for, if they are dried in the sun, they will shrink very much, turn black, and prove of little value. Your dung-hills and compost-heaps should, during the summer months, be kept free from weeds, for if the seeds are permitted to ripen and fall, the dung when carried into the garden, will disseminate weeds innumerable. Attend to plants set out for seed, and put stakes to such as need support. This month, as well as the latter part of July, is the proper season for inoculating or budding. M'Mahon says, " Cherries, plums, or any other fruit-trees, may be budded in August, if the bark parts freely from the stock. Pears ought to be inoculated the early part of the month, or while the sap flows freely; but the peach, nectarine, almond, and apple, will succeed any time between the first of August and twentieth of September, provided the stocks are young and vigorous."

Preserve peach, plum, cherry, and apricot stones, &c., to sow for raising stocks to bud and graft on. These may either be sown immediately, or kept in common garden earth, or moist sand. But it will be necessary to sow them before the stones open, and the radicles begin to shoot; otherwise many of them will be broken or torn in the process of sowing. Every day they are kept out of ground is an injury to them; and if they remain in a dry state till spring, very few will vegetate till a year after, and the greater number not at all. Continue to collect and preserve seeds as directed last month. Sow onions to stand over winter, 72; likewise, cauliflowers, 41.

SEPTEMBER.

Hoe and thin your growing crops of spinach, 103. In the first week of this month, sow a full crop of the prickly-seeded kind for winter and spring use, 103. And, at the same time, you should sow a good supply of the early short-top, white and red turnip-rooted and salmon radishes, 95. Earth up celery as it advances in growth, but be careful to avoid covering the hearts of the plants. This work should be done in a dry day. See that you do not bruise or injure the stalks; for if they are crushed or wounded, they will be subject to rot. Gather all kinds of seeds as they ripen, which may be necessary for the ensuing season. Towards the latter end of the month, you may safely transplant all kinds of hardy perennial, aromatic, and medicinal herbs, which will thus become well rooted before winter. This work should, if possible, be done in moist weather. Pull and preserve your ripe onions, 72, and sow more to stand over winter, 76. Protect your grapes and other fruit against wasps. This may be done by hanging up phials of honeyed or sugared water near the fruit you wish to defend from their attacks, in which many of the tiny depredators will be caught and destroyed. Thoroughly clean from weeds all the seed-beds and young plantations of trees, shrubs, &c. Gather cucumbers and mangoes for pickling before they spot. Sow cauliflowers about the 20th, 41.

OCTOBER.

The young cabbage plants, produced from seeds sown last month, and intended for early summer cabbages, should be transplanted into the beds in which they are to remain during winter, 30.

Prepare a bed for them, the width of your garden frame, in a warm, well-sheltered place, where the sun has the greatest power; yet be careful never to admit the direct sunshine on the plants, when in a frozen state. When you have no glasses, the plants may be protected during winter by boards or mats, giving air in mild weather. Cauliflowers sown in August or September should be raised carefully, and protected, during the cold season, in garden frames, with boards, mats, &c., or perhaps some may survive if set in open borders, or they may be set in pots, 42. Weed and thin your late crops of spinach, leaving the best plants at the distance of three, four, or five inches asunder, 103. Early in the month, hoe and earth up the late-planted crops of cabbages, broccoli, and borecole, cauliflowers and other plants of the brassica genus. Towards the end of the month, if the stalks of asparagus turn yellow, cut them close to the earth; clear the beds and alleys from weeds, and carry them with the stalks off the ground. It will then not be amiss to cover the beds and alleys with old litter, well trodden down, to be removed in the spring. Or you may apply manure now, instead of in spring, as you judge best. Cut down all decayed flower stems, and shoots of the various kind of aromatic, pot and medicinal herbs, close to the plants; clear the beds from weeds and litter, and carry the whole off the ground. Onions may now be planted out to raise seed, instead of setting them in the spring, as directed p. 76. The seeds of dill, skirret, rhubarb, sea-kale, may now be sown; for, if kept out of ground till spring, many of them will not vegetate till a year after; but when sown in October or November, if the seeds are fresh and perfect, they will vegetate in the April following. Begin to take up and secure potatoes, 87, beets, 22, carrots, parsneps, turnips, Jerusalem artichokes, &c., 13. Give a general hoeing and weeding to all your crops, and carry the weeds out of the garden. Such spaces of ground as are now vacant should be dunged, dug, or trenched, and thus have the advantage of a winter fallow, and that exposure to frost, which will reduce it to fine tilth, and destroy worms, the larvæ of insects, &c. The old beds of strawberries should, some time in this month, be cleaned from weeds, and the vines or runners taken off close to the plants. Then, if there be room, loosen the earth to a moderate depth between the plants, taking care not to disturb the roots. And if the plants are in beds with alleys between, line out the alleys, and let them be dug a moderate depth, breaking the earth very fine. and spreading a sufficiency of it over the beds, between and round the beds, taking care not to bury their tops. A slight top dressing of compost, such as described p. 286, may now be applied. It may now be time to gather and preserve apples and pears, though it is best to let them remain on the trees as long as they are safe from frost. If you are not apprehensive of the depredations of mice, rats, squirrels, &c. you may sow the stones of plums, peaches, nectarines, apricots, &c.; or you may, if you think it more prudent, preserve them in sand till March or April.

NOVEMBER.

Gather from your garden, before the hard frosts commence, all those fruits of your labors, which you wish to preserve through the winter, not forgetting winter squashes. Take up and preserve cabbages, as directed p. 35. Preserve your celery, 44. You may gather a part in dry weather, and pack it in boxes in dry sand, and place the boxes in a warm cellar, leaving the tops and leaves open to the air. Those cabbage and cauliflower plants, which you mean shall stand through the winter in frames, should, during the continuance of mild weather, be allowed every advantage of free air, to inure them, by degrees, to bear cold. Take the glasses off entirely, in the warm part of the day, but place them again at night, and in wet or cold weather. If your beets, turnips, parsneps, &c. are not secured, take them up, and preserve them, as directed last month. You may now sow the seeds of rhubarb, sea-kale, skirrets, parsneps, and many other kinds, which are somewhat slow in vegetating, and they will come forward early, and grow vigorously in the spring. In the beginning of this month, you may manure and trench the ground which is intended for early crops, and, if it be of a stiff, heavy nature, lay it up in ridges, to receive the benefit of the winter frosts You may now sow early peas, to come up in the spring, if you can preserve them against mice, 84. This is, perhaps, as eligible a period as any for the planting of apple-trees, and other fruit-trees, or sowing seeds in a nursery. Lay light litter of some kind a good thickness over the roots of the more tender and choice kinds of trees and shrubs, to protect them from frost.

DECEMBER.

The severity of the weather in this month generally allows but little to be done in the Middle and Northern States. Should the season permit, you may perform any of the operations directed for last month, which remain unfinished. If the weather continues open, carry out and spread manure, and trench the ground, as directed for the last month. Provide from the woods, &c. pea-sticks and bean-poles, of suitable lengths and sizes, as directed in January. Collect all your old sticks and poles, which are still fit for use, and place them together with your new ones under cover, to prevent their rotting. Be careful to shut the frost out of the apartments in which you have stored your fruit for winter and spring use. Examine the fruit which you have on shelves in cellars, once every ten days, and take away any that you find tainted. Repair all decayed trellises, espaliers, &c. Procure stakes and other materials which may be wanted in a more busy season.

SAXTON'S COTTAGE AND FARM LIBRARY.

THE

AMERICAN ROSE CULTURIST;

BEING A

PRACTICAL TREATISE

ON THE

PROPAGATION, CULTIVATION, AND MANAGEMENT

OF

THE ROSE

IN ALL SEASONS; WITH A LIST OF CHOICE AND APPROVED VARIETIES,
ADAPTED TO THE CLIMATE OF THE UNITED STATES:

TO WHICH ARE ADDED

FULL DIRECTIONS FOR THE TREATMENT OF

THE DAHLIA.

Illustrated by Engravings.

WISDOM OF GOD IN CREATION.

"——No flower that blows
Is like the Rose, nor scatters such perfume."

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ADVERTISEMENT.

THE marked effect with which the "Cottage Bee Keeper" was received, as the first of the series of **"Saxton's Cottage and Farm Library,"** has led the Publisher to issue the present treatise on the Rose and the Dahlia.

No pains will be spared in bringing out the succeeding volumes agreeably to the plan of the original design; and if practicable, it is hoped that they will be still more deserving of success than those which have already appeared.

The publisher acknowledges his indebtedness to Messrs. Lea and Blanchard, of Philadelphia, for the permission granted for using Landreth's "Dictionary of Modern Gardening," in the compilation of this work. He also takes this occasion to thank Mr. William H. Starr for the use of several engravings herein employed.

C. M. SAXTON,
AGRICULTURAL BOOK PUBLISHER,
152 FULTON STREET.

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THE ROSE.

INTRODUCTION.

> Rose! thou art the sweetest flower
> That ever drank the amber shower;
> Rose! thou art the fondest child
> Of dimpled Spring, the wood nymph wild.
>
> **Anacreon.**

THE Rose, the emblem of beauty and the pride of Flora, reigns Queen of the Flowers in every part of the globe; and the bards of all nations and languages have sung its praises. Yet what poet has been able, or language sufficient, to do justice to a plant that has been denominated the Daughter of Heaven, the glory of spring, and the ornament of the earth? As it is the most common of all that compose the garland of Flora, so it is the most delightful. Every country boasts of it, and every beholder admires it. Poets have celebrated its charms without exhausting its eulogium; for its allurements increase upon a familiarity, and every fresh view presents new beauties, and gives additional delight. Hence it renovates the imagination of the bard, and the very name of the flower gives harmony to his numbers, as its odors give sweetness to the air.

To paint this universal emblem of delicate splendor in its own hues, the pencil should be dipped in the tints of Aurora, when arising amidst her aërial glory. Human art can neither color nor describe so fair a flower. Venus herself feels a rival in the Rose, whose beauty is composed of all that is exquisite and graceful. It has been made the symbol of sentiments as opposite as various. Piety seized it to decorate the temples, while Love expressed its tenderness by wreaths; and Jollity revelled adorned with crowns of roses. Grief strews it on the tomb, and Luxury spreads it on the couch. It is mingled with our tears, and spread in our gayest walks; in epitaphs, it expresses youthful modesty and chastity, while in the songs of the Bacchanalians their god is compared to this flower. The beauty of the morning is allegorically represented by it, and Aurora is depictured strewing roses before the chariot of Phœbus:

> "When morning paints the orient skies,
> Her fingers burn with roseate dyes."

The Rose is thought to have given name to the Holy Land where Solomon sang its praises, as Syria appears to be derived from *Suri*, a beautiful and delicate species of Rose, for which that country has always been famous; and hence called *Suristan*, or the "Land of Roses." The island of Rhodes owes its name to the prodigious quantity of roses which formerly grew upon its soil.

Of the birth of the Rose, it is related in fable, that Flora having found the corpse of a favorite Nymph, whose beauty of person was only surpassed by the purity of her heart and chastity of her mind, resolved to raise a plant from the precious remains of this daughter of the Dryads, for which purpose she begged the assistance of Venus and the Graces, as well as of all the deities that preside over gardens, to assist in the transformation of the Nymph into a flower, that was to be by them proclaimed Queen of all the vegetable beauties. The ceremony was attended by the Zephyrs, who cleared the atmosphere, in order that Apollo might bless the new-created progeny by his beams. Bacchus supplied rivers of nectar to nourish it, and Vertumnus poured his choicest perfumes over the plant. When the metamorphosis was complete, Pomona strewed her fruit over the young branches, which were then crowned by Flora with a diadem, that had been purposely prepared by the celestials to distinguish this Queen of lowers.

Anacreon's birth of the Rose stands thus translated by Moore:

"Oh! whence could such a plant have sprung?
Attend—for thus the tale is sung;
When, humid from the silvery stream,
Venus appeared, in flushing hues,
Mellowed by ocean's briny dews—
When, in the starry courts above,
The pregnant brain of mighty Jove
Disclosed the nymph of azure glance—
The nymph who shakes the martial lance!
Then, then, in strange eventful hour,
The earth produced an infant flower,
Which sprung, with blushing tinctures drest,
And wantoned o'er its parent's breast.
The gods beheld this brilliant birth,
And hailed the rose—the boon of earth!
With nectar drops a ruby tide,
The sweetly-orient buds they dyed,
And bade them bloom, the flowers divine
Of him who sheds the teeming vine;
And bade them on the spangled thorn
Expand their bosoms to the morn."

The first Rose ever seen was said to have been given by the god of love to Harpocrates, the god of silence, to engage him not to divulge the amours of his mother Venus; and from hence the ancients made it a symbol of silence, and it became a custom to place a Rose above their heads in their banqueting rooms, in order to banish restraint, as nothing there said would be repeated elsewhere; and from this practice originated the saying, *sub rosa*, (under the rose,) when anything was to be kept secret.

Oriana, when confined a prisoner in a lofty tower, threw a wet Rose to her lover to express her grief and love; and in the floral language of the East, the presenting a rose bud with thorns and leaves, is understood to express both fear and hope; and when returned, reversed, it signifies that one must neither entertain fear nor hope. If the thorns be taken off before it is returned, then it expresses that one has everything to hope; but if the leaves be stripped off, it gives the receiver to understand that he has everything to fear.

The Moss Rose is made the emblem of voluptuous love; and the creative imagination of a German poet thus pleasingly accounts for this Rose having clad itself in a mossy garment:

The angel of the flowers one day
Beneath a rose tree sleeping lay.

That spirit to whose charge is given
To bathe young buds in dews from heaven,
Awaking from his light repose,
The angel whispered to the rose,—
'Oh, fondest object of my care,
Still fairest found where all are fair,
For the sweet shade thou'st given to me,
Ask what thou wilt, 'tis granted thee.'
'Then,' said the rose, with deepened glow,
'On me another grace bestow.'
The spirit paused in silent thought—
What grace was there that flower had not?
'Twas but a moment—o'er the rose
A veil of moss the angel throws;
And, robed in nature's simplest weed,
Can there a flower that rose exceed?'

SPECIES AND VARIETIES

Botanists enumerate at least eighty distinct species of the Rose, and florists an almost innumerable number of varieties and sub-varieties, most of which are hardy, deciduous, or evergreen shrubs. To attempt a description or even to give a list of the names of all of these would be foreign to the design of this little treatise, and would be a needless waste of time, for the simple reason that many of them are unworthy of preservation, while in others, nothing short of the nicest and the most minute inspection can discover any difference.

The following are the names and characters of the more important and desirable members of this family, best adapted to this country and may be purchased at any of our principal florists:—

Bengal or Daily Roses.

Names.	*Color and Character.*
Animated,	Rosy blush.
Arsenie,	Light rose.
Augustine Hersent,	Superb rose.
Assuerus,	Crimson.
Admiral Duperre,	Dark rose.
Belle Isidore,	Crimson.

Names.	*Color and Character.*
Belle de Monza,	Dark rose.
Belle violet,	Violet purple.
Bisson,	Rosy blush.
Burette,	Dark red.
Cameleon,	Rose.
Cramoisi supérieur,	Crimson.
Cels,	Blush.
Comble de gloire,	Crimson.
Don Carlos,	Dark rose.
Duchess of Kent,	Pink.
Eugene Beauharnais,	Crimson.
Fabvier,	Scarlet.
Grandral,	Crimson.
Grandida,	Rose.
Hortensia,	Light rose.
Indica alba,	Pure white.
Jacksonia,	Bright red.
Louis-Philippe,	Crimson.
Lady Warrender,	White.
Laurencia,	Pink.
Marjolin,	Crimson.
Mrs. Bosanquet,	Large, blush.
Napoleon,	Rose, fine.
Reine de Lombardie,	Cherry red.
Samson,	Light rose.
Triomphant,	Crimson.
Vanilla,	Dark rose.

Tea-scented Roses.

Names.	*Color and Character.*
Archduchess Theresa,	White.
Aurora,	Blush.
Alba,	Pure white.
Arkinto,	Flesh color.
Adelaide,	Blush.
Antherose,	Blush white.
Adam,	Rosy blush.
Belle Marguerite,	Rosy purple.

Names.	*Color and Character*
Bougère,	Light rose.
Boutrand,	Rosy blush.
Bon Silène,	Superb red.
Bourbon,	White.
Barbot,	Blush.
Camellia,	White.
Caroline,	Bright rose.
Countess Albemarle,	Straw color
Duc d'Orléans,	Bright rose.
Devoniensis,	Creamy yellow.
Devaux,	Blush.
Delphine Gaudot,	White.
D'Arrance de Navarre,	Light pink.
Eliza Sauvage,	Pale sulphur.
Flon,	Buff.
Flavescens,	Yellow.
Golcondi,	Blush white.
Goubault,	Rosy blush.
Gigantesque de Lima,	Light yellow.
Gloria de Hardi,	Light rose.
Hyménée,	White.
Jaune Panaché,	Straw color.
La Sylphide,	Rosy buff.
Lilicina,	Lilac.
Lyonnais,	Rose.
La Pactole,	Yellow.
La Renomme,	White.
Madame Desprez,	White.
Mansais,	Rosy buff.
Niphetos,	White.
Odoratissima,	Rich blush.
Princesse Maria,	Blush.
Princesse d'Esterhazy,	Light rose.
Strombio,	White.
Triomphe de Luxembourg,	Rosy blush.
Victoria modeste,	Blush.
William Wallace,	Pale blush.

Bourbon Roses.

Names.	*Color and Character.*
Augustine Lelieur,	Bright rose.
Acidalie,	White, large, and fine.
Comte de Rambuteau,	Violet purple.
Ceres,	Dark rose.
Cytherea,	Rosy pink, very fragrant.
Comte d'Eu,	Bright carmine.
Doctor Rocques,	Purple crimson.
Dumont de Courset,	Deep purple.
Du Petit Thouars,	
Emilie Courtier,	Rosy red.
Gloire de Rosamene,	Brilliant crimson.
Gloire de Paris,	Bright red.
Grand Capitaine,	Brilliant scarlet.
Gloire de France,	Rose, very fragrant.
Hermosa,	Light pink.
Henri Plantier,	Pale rose.
Impératrice Josephine,	Creamy white.
Lady Canning,	Deep rose.
Madame Desprez,	Rosy lilac.
Madame Souchet,	Blush, fine.
Madame Lacharme,	Blush white.
Madame Nerard,	Light rose.
Maréchal de Villars,	Rosy purple, fine.
Ninon de l'Enclos,	Dark rose.
Paul Joseph,	Velvet crimson.
Princesse Clementine,	Deep rosy purple.
Phœnix,	Rose red.
Pierre de St. Cyr,	Light rose.
Queen,	Delicate blush.
Reine de Fontenay,	Brilliant rose.
Souchet,	Deep crimson.
Souvenir de la Malmaison,	Creamy white, fine.
Théresita,	Bright carmine.

Remontant or Hybrid Perpetual Roses.

In Europe, these Roses are highly esteemed; here, their reputation as "perpetuals," has been seriously injured, in consequence of their having been, in many instances, worked on stocks unsuited either to them, or to our climate.—*Landreth.*

Names.	*Color and Character.*
Antinous,	Dark crimson.
Aubernon,	Clear red, very fine.
Augustine Mouchelet,	Clear bright rose.
Baronne Provost,	Fine rose color.
Comte de Paris,	Dark crimson.
Claire du Chatelet,	Purple red.
Clementine syringe,	Pale rose.
Comtesse Duchatel,	
Crimson or rose du roi,	Light crimson.
D'Angers,	Delicate rose.
Doctor Marjolin,	
Duc d'Aumale,	
Duchesse de Nemours,	Pale rose.
Duchesse de Sutherland,	Bright rose.
Edouard Jesse,	Dark purple crimson.
Isaure,	Bright pink.
Israel,	Sable.
Insigne D'Estotells,	
Josephine Antoinette,	Rosy blush.
Louis Bonaparte,	
Lady Fordwich,	Deep Rose.
Lady Alice Peel,	Rosy carmine.
La Reine, or Queen,	Rose color, superb.
Madame Laffay,	Brilliant rose.
Marquise Bocella,	
Mrs. Elliott,	Rosy red.
Melanie cornu,	Deep crimson.
Newton,	
Palmyre,	Blush.
Princesse Héléne,	Large deep rose.
Prince Albert,	Very dark crimson, fine.
Prudence Rœser,	Rosy pink.

Names.	*Color and Character.*
Prince de Salm,	Dark crimson.
Prince of Wales,	Rose carmine.
Reine de la Guillotière,	Brilliant crimson.
Desquermus or Royal,	Large rose.
Stanwell,	Blush, very fine.
Sisley,	Large bright red.

Noisette or Cluster-Flowering Roses.

Names.	*Color and Character.*
*Alba,	Creamy white.
*Aimée Vibert,	Pure white.
Bengal Lee,	Blush, fragrant.
Cadot,	Blush lilac.
Charles Tenth,	Purple.
Conque de Venus,	White rose centre.
Cœur Jaune,	White yellow centre.
Champneyana,	Rosy white.
*Comtesse de Grillion,	Blusn.
Chromotelle,	Large yellow, fine.
*Euphrosine,	Pale yellow.
Fellenberg,	Crimson, superb.
*Gabriel,	Blush, fine.
Jaune Desprez,	Rosy yellow.
*Julienne le Sourd,	Rose.
Julie de Loynes,	White.
Lamarque,	Creamy white, fine.
La Biche,	Flesh color.
Lady Byron,	Pink, fine.
Lutea, or Smithii,	Fine yellow.
Landreth's carmine,	Carmine.
*La Nymphe,	Pale rose.
Miss Simpson,	Blush.
Orloff,	Pink, fine.
*Ophire,	Yellow, fragrant.
Sir Walter Scott,	Deep rose.
Solfatare,	Superb dark yellow.
Vitellina,	White.

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* Those marked * are dwarfs.

Climbing Roses.

These flower annually in immense clusters, grow rapidly, and are quite hardy.—*Landreth.*

Names.	*Color and Character.*
Banksia lutea,	Double yellow.
Banksia alba,	White.
Boursault,	Rose color.
Boursault purpurea,	Purple.
Boursault blush,	Large blush.
Boursault gracilis,	Bright rose.
Bengalensis scandens,	Large rosy white.
Félicité perpetuelle,	Blush white.
Grevillia,	Greville produces immense clusters, of various colors and shades, from white to crimson.
Multiflora,	Pink.
Multiflora alba,	Blush white.
Rubifolia, Single Michigan or Prairie,	
Rubifolia elegans,	Double pink.
Rubifolia purpurea,	Double purple.
Rubifolia, Queen of the Prairies,	Double pink.
Rubifolia alba,	Double blush white.
Russelliana,	Crimson cottage rose.
Sempervirens plena,	Superb white.
Triomphe de Bollwyler,	Blush white.
Laura Davoust,	White.

Microphylla Roses.

Names.	*Color and Character.*
Maria Leonida,	White, extra fine.
Microphylla rosea,	Rose color.
Microphylla odorata alba,	Creamy white.

Musk-scented Roses.

Names.	*Color and Character.*
Moschata,	White semi-double.
Moschata superba,	Pure white, very double.
Princesse de Nassau,	White double.

Hardy Garden Roses.

Names.	*Color and Character.*
Miaulis,	Rosy purple.
Coronation,	Purple crimson.
Reine des roses,	Bright crimson.
Duc d'Orléans,	Dark rose.
Painted Damask,	White.
Brennes,	Dark pink.
Rivers' George IV.,	Superb crimson.
Hybride blanche,	White.
Heureuse surprise,	Carmine.
Ranunculus,	Purple, compact.
La capricieuse,	Purple crimson.
Royal Provins,	Superb pink.
Du Roi,	Perpetual, bright red.
Harrisonii,	Yellow Austrian brier.
Moss, Single,	Crimson, very mossy.
Moss, Common,	Rose.
Moss, Luxembourg,	Crimson.
Moss, White,	Perpetual.
Moss, Crested,	
Moss, Adelaide,	
York and Lancaster,	Red and white.
Provins Belgic,	Large pink.
Four Seasons,	Pink.
Moretti,	Light rose.
Burgundy,	Rose, compact.
Persian,	Double yellow.
Village Maid, or La Belle Villageoise,	Rose, striped with lilac.
Austrian Brier	Deep yellow

In contemplating some of the best Roses from the various families, we cannot help admitting, that, compared with the old and still valued varieties, more than two-thirds even of our selections are not so good in character. The love of novelty is all-powerful; a shade of color, the slightest difference in habit, a different season of bloom, an alteration in the size or color of the foliage, the distinction between a slow and a fast growth, have always been considered sufficient by sellers to warrant a new name and a place in the catalogues; and the Rose, unlike all other flowers, began with better varieties than hundreds of their successors, or rather their younger rivals, proved to be.

Notwithstanding many of the early Roses were really beautiful, and hardly admitted of much improvement, we had, at a very early period of the fancy, such Roses as the Tuscan, the Cabbage, the Cabbage Moss, the Maiden's Blush, White Provence, and Double Yellow. These have, it is true, been succeeded by a few worthy of ranking with them, but they have to be selected from thousands infinitely worse, and hundreds which ought not, for the raiser's honesty, or the buyer's good sense, to have even passed the seed bed. If, therefore, we were to select, to lessen our readers' difficulty in choosing, we could not recommend them as Roses equal to old favorites; for not one in fifty would beat the few we have mentioned, and which ought to be the first they furnish.

The Provence Rose.

The Provence Rose, or, as it has been called, the Hundred-leaved Rose, is a distinguishing title for every Rose that has a remarkably double flower, unless there is something in the habit or character that claims for it another title. If this were understood, we should know what we are about. The Moss Rose would clearly come under this, were it not for the moss; for the old Cabbage Rose, and the Moss Rose strongly grown, would not be known from each other, except for the Moss; and the Moss Rose would be a Moss Rose, if ever so single, though its original were double and fine. Now, the Provences, of which the old Cabbage Rose is a sort of type, and generally called the Hundred-leaved Rose, ceases to deserve this name, if semi-double. So that although the origin of the family is rightly named, many pushed into the same list do not deserve the name.

Moss Rose.

This family is distinguished by the mossy appearance of their stems and the calyx, and therefore there is no difficulty in recognising any member of the family.

The French Rose.

This, to some of our readers, would appear to mean roses raised in France. It happens, however, that the original was, as many of the leading ones were, raised by Van Eden, in Holland, and it was years before the French raised a single seedling from them; nevertheless some of the so-called varieties were raised in France, but as there are hundreds raised in that country which are not belonging to this family, the distinguishing name fails; and were it not so, they are so unlike each other that one could not recognise, in any particular feature, enough to decide, nor do the rose growers themselves appear more certain.

Hybrid Provence Roses.

These are said to be intermediate between French and Provence roses, because they have the long shoots of one and the dense foliage of the other; the said long shoots and dense foliage being the characteristics of roses of other families in quite as large a degree, and even in this very family, we have varieties which seem to be between the Boursault and Provence. So that all is indecision, change, uncertainty, and frivolity. In this family, the distinguishing character is that they "are robust and hardy;" so are hundreds that do not belong to it.

Hybrid China Roses.

We are told of this family, that the numerous varieties give a combination of all that is beautiful in a Rose. They are said to owe their origin to all sorts of crosses; but there is a distinguishing feature in these, if it be adhered to: "leaves smooth, glossy, and sub-evergreen; branches long, luxuriant, and flexible." Then, again, we are informed "that hybrids produced from the Rose, impregnated with the China

Rose, are not of such robust and vigorous habits as when the China Rose is the female parent." This looks like plain, straightforward information; but it is followed by the same incertitude as some of the other distinguishing features of families. Mr. Rivers adds: "But, perhaps, this is an opinion not borne out by facts; for the exceptions are numerous, and like many other variations in roses, and plants in general, *seems to bid defiance to systematic rules.*" Of course, they do; and, with the exception of those names which bespeak a distinct character, the splitting of this beautiful flower into so many different families at all, was a very injudicious measure. Athelin, a Rose classed in this group, is called also a Hybrid Bourbon, and as it blooms in clusters, would have been much better understood if called a Noisette. It comprises other roses as unlike each other as can be well imagined, and many of them will shoot ten feet in a season, and would be much more at home if classed as Climbing Roses. Belle de Rosny, among this family, is nevertheless called also a Hybrid Bourbon, and many others of this family are destined to be removed, if the senseless distinctions by name are to be kept up.

White Roses.

Here we have an illustration of the extreme folly of the present distinctions. We are told the roses of this division may be easily distinguished by their green shoots, and leaves of a glaucous green, looking as if they were covered with a grayish impalpable powder; and flowers generally of the most delicate colors, graduating from a pure white to a bright but delicate pink.

The Damask Rose.

This is as incongruous a group as any. Blanche borde de rouge has flowers sometimes a pure white, at others margined with red. Claudine has flowers of a pale rose color. York and Lancaster, also classed among them, has flowers striped with red and white. Coralie is flesh color. Then we have Madame Hardy, which, we are fairly told, "is not a pure Damask Rose;" perhaps not, as it is white, and unlike all the rest. Then, there is the Duke of Cambridge, which Mr.

Rivers "at first thought a Hybrid China," and says, "will, perhaps, be better grouped with the Damask Roses."

Scotch Roses.

So long as this family was allowed to be kept select, these roses were very distinct; they make long briery shoots, and flower with small blooms almost like briers, the whole length of stems. They are exceedingly pretty, formed as a bank, or in clumps. They are not adapted for standards. They bloom early, and the Scotch nurserymen now boast of two or three hundred varieties; but like all the other families, there are many among them that have been raised from seed, and others imported, which are neither by name nor nature Scotch. Amiable étrangère is a French hybrid. Adelaide is a large Red Double Rose. La Cenomane is a French hybrid with large flowers, "not so robust as the pure Scotch varieties."

The Sweet Brier.

This lovely ornament, or rather tenant of the garden, is universally admired for the delicious fragrance of its foliage, and for nothing else. It is only necessary to say here, that others whose leaves are not fragrant have been placed with it to make a family; some of the new members having but little fragrance, and one, the Scarlet Sweet Brier, none at all.

The Austrian Brier.

Here we have the same evidence of indecision as to where things ought to be placed. In this scentless family we have Williams' Double Yellow Sweet Brier. In fact, the Sweet Brier and the Austrian Brier are muddled together so completely that catalogues do not agree, and the further we go, the more confusion we get into, and more instances occur of removal from one division to another.

The Double Yellow Rose

Here we have only two individuals, the old Double Golden Yellow, so beautiful and double as to be universally admired, and the Jaune, a dwarf kind, both shy bloomers under ordinary management, or when we come to the right of it, never blooming well till they are matured, which takes some years. Of course, there are many Double Yellow Roses, but only two are admitted into this select family.

Climbing Roses.

Here we might expect to find all those roses which, from their habits, were adapted to the fronts of houses, pillars, trellises, and other lofty stations. One would, at least, expect that, if Climbing Roses mean anything, it means all roses that will climb. No such thing. Having pushed, we know not how many roses that climb into other families, of course they cannot be here. We have various divisions in this family notwithstanding: First, we have the Ayrshire Rose, which is said to be a hybrid, accompanied by several others called Ayrshire Roses also; next, we have the second division, called Rosa multiflora, said to be a native of Japan, and a number of companions as unlike it as may be; not that there are any among this family that do not climb, but there are very many as good Climbing Roses shut out from it.

The *Queen of the Prairies*, or Michigan Rose, is remarkable for its perfectly hardy growth, flourishing equally well in Canada at the north, and in Texas at the south. It grows with unparalleled rapidity, exceeding all other roses of this family, covering an entire arbor or an old building in a short space of time. It blooms, also, after other summer roses are mostly gone, its flowers occurring in large clusters of different shades.

Evergreen Roses.

Here there can be no mistake: an Evergreen Rose must be an Evergreen Rose; but, although we have some enumerated, there are plenty of Evergreen Roses not admitted into this family, but pushed about in all directions, some crammed into the China, and some into the Hybrid China.

Boursault Roses.

This is said to be "a most distinct group of roses, with long reddish flexible shoots;" yet Gracilis is affirmed to be "unlike the other varieties of this division." They are said to be good Climbing Roses, making ten feet of growth in the season.

Banksian Roses.

The White and Yellow Banksian Roses are very beautiful plants, with small foliage and flowers, very graceful, and distinct as any in cultivation; yet we have a rose-colored hybrid introduced with them; a plant acknowledged to partake "as much of the character of the Boursault Rose, as of the Banksian."

Hybrid Climbing Roses.

These, one would think, are neither Climbing nor Dwarf, but between both. Not so, however; because Rosa craculum makes shoots from ten to fifteen feet in a season. Madame d'Arblay, or Well's White, has been formerly placed among the Evergreen Roses; but whether she misbehaved herself there, or was a great favorite here, is of no consequence. She was removed from that family to this. We are, however, informed, with regard to her sojourn among the family of Evergreens, and subsequent removal, that her "habit is so different and her origin so well ascertained, that Mr. Rivers removed her to the present family."

Perpetual Roses.

These, if the rose gentlemen would stick to the character, would be very easily defined—roses which have a complete season of bloom; which go off but a short time; make a fresh season of bloom, and so on. Not like the China Roses, always "growing and blooming," but fairly making different seasons of bloom, as complete as if a winter intervened.

The Bourbon Rose.

The original Bourbon Rose was a hybrid between the Common China and the Red Four Seasons. Of course, this was quite enough reason for rose growers to add to the family all that were something like it, and others that were nothing like it. Here let Mr. Rivers speak: "Diaphane is a small high-colored Rose, almost scarlet. This is not a true Bourbon." The fact is, there is nothing like the Bourbon Rose about it. Here we have also Gloire de Rosamène, unlike the Bourbon Rose in everything. It is a robust Climbing Rose, of which even Mr. Rivers himself says, "As a Pillar Rose, it will form a splendid object." The White Bourbon, which the French cultivators are at war about, "some swearing," as Mr. Rivers tells us, "by all their saints that it is a veritable Bourbon, while others as strongly maintain that it is a Noisette;" and from its clustered flowers the latter are nearest right. But all this arises from the multiplication of families.

China Roses.

Everybody knows the Pale China and the Dark China Roses, which may be seen decorating the cottages of our industrious classes as well as the gardens of the rich. They were, however, Bengal Roses, and not natives of China. Now the distinguishing characteristic of the Bengal, or, as now called, China Rose, is smooth bark, with the thorns distant from each other; shining leaves, and constant growing and blooming. These features could be well understood by everybody; but everything that can be at all traced to have any one of these features, and cannot be easily placed in other families, must come to this; and so we have plenty, and a most beautiful family it is.

Tea-scented China Roses.

This is an acknowledged variation of the Bengal, or, as the rose dealers will have it, China Rose; but it is a true China, imported into England from that empire in 1810. It is said to have been the parent of this large family; but here we have the same difficulty that presents itself in other families—there is no place to draw the line; they are China Roses, and only China Roses, but they are stronger scented than the Bengal, called Common China, and it is difficult to detect the difference between the highest perfumed of the former class and the lowest perfumed of the China Tea Roses, as now classed.

Miniature Roses.

This family is also said to be China, possessing all the marked features; but it is smaller than the others, and is acknowledged by Mr. Rivers to be only a dwarf variety of the Common China, or, as we insist, Bengal. It is worthy of remark, that all those so-called China Roses have the characteristics we have mentioned, the constant growing and blooming, if kept in order under proper protection; and are not deciduous.

The Noisette Rose.

The distinguishing character of this Rose is that it flowers in bunches, and this ought to be the character of every one added to the family. But here we have Lamarque, which is anything but a Noisette; it does not flower in bunches, unless every Rose which has two or three flowers on a stem is to be called Noisette; and Smith's Yellow Noisette is about as much entitled to the name of Lamarque. But they are not alone; too many which have no claim on the family have nevertheless been forced on them.

The Musk Rose.

This is an old favorite, and many which have been supposed to come from its seed are fastened on it as a family, and many not very like the parent. The family, like some of the others, is greatly confused, and there is nothing so distinct as to connect it as a separate class.

The Macartney Rose.

The characteristic of this Rose is its very bright thick evergreen foliage, and therefore any other Hybrid Roses which have that characteristic might, according to other classifications, be put among these. Maria Leonida is perhaps the best of them; Rosa berberifolia hardii, of whose origin Mr. Rivers makes a sad muddle, is classed with this family. Mr. Rivers' story is, that "Rosa hardii was raised from seed by Mons. Hardy, of the Luxembourg Gardens, from Rosa involucre, a variety of Rosa bractcata, fertilised with that unique rose, Rosa berberifolia which was very frequently exported from Persia, and comes always true to the parent; some of the Persian seed was sent to Mons. Hardy, and from that he, like others, raised the true Rosa berberifolia, which Mr. Lee, of the Hammersmith Nursery, raised from Persian seed likewise, more than twenty years before Mr. Hardy was a rose raiser at all." Well may Mr. Rivers say, in continuation, "This curious hybrid, like its Persian parent, has single yellow flowers, with a dark eye, and evergreen foliage." The fertilising part of the busi ness is the mere work of a fertile imagination. When any one has got Rosa berberifolia, he need not trouble himself about whether he has it from the seed raised by Mons. Hardy, or the seed raised by his predecessors. There is no more variation, and no more hybrid about either, than there is in two plants of small salad.

Rosa Microphylla.

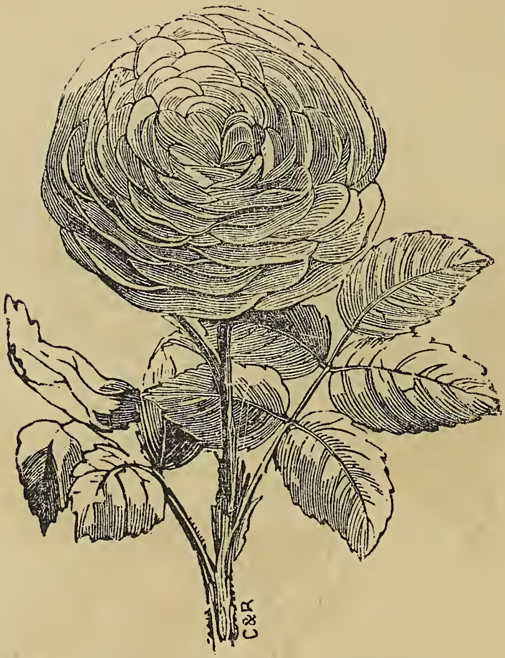
This, we are told, is nearly allied to the Macartney Rose; so are the varieties of it, and ought not to have been separated.

QUEEN (ROSA bourboniana).

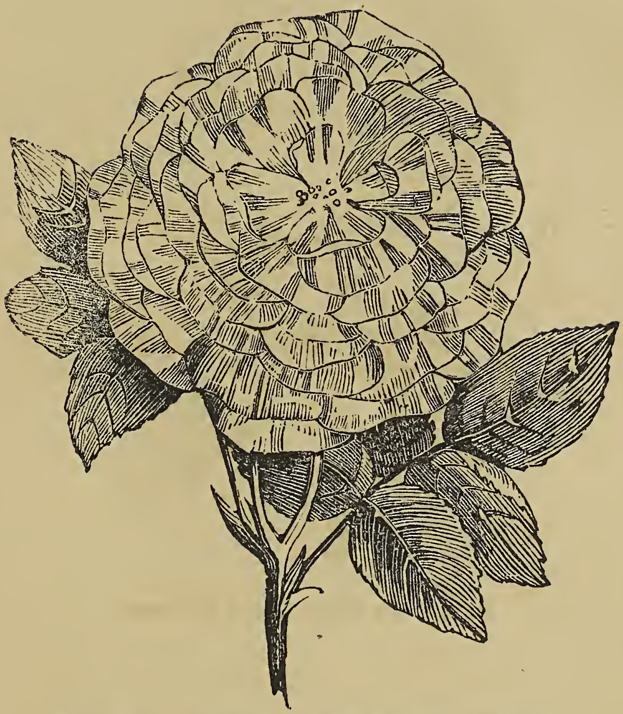
Jaune Desprez (Yellow Rose)

Yellow Banksian Rose (Rosa banksia lutea

SMALL LEAFLETTED ROSE (Rosa microphylla).



BURGUNDY ROSE (Rosa gallica).



THE VILLAGE MAID (La Belle Villageoise).

WILLIAMS DOUBLE YELLOW SWEET BRIER.

CHARACTERISTICS OF A FINE ROSE.

There is no flower more difficult to define than the Rose, and the difficulty arises out of several curious facts. First, it is the only flower that is beautiful in all its stages—from the instant the calyx bursts and shows a streak of the corolla, till it is in full bloom. Secondly, it is the only one that is really rich in its confusion, or that is not the less elegant for the total absence of all uniformity and order. The very fact of its being beautiful from the moment the calyx bursts, makes the single and semi-double roses, up to a certain stage, as good as the perfectly double ones; and there is yet another point in the formation of some varieties, which makes them lose their beauty when they are full blown. For instance, the Moss Rose is a magnificent object so long as the calyx is all seen, but so soon as the flower fully expands, all the distinction between a Moss Rose and a common one has departed, or is concealed. This brings us at once to an acknowledgment that the grand characteristic of a Moss Rose is its calyx. These properties must never be estimated by full-blown flowers, and therefore, all varieties of Moss Roses must be exhibited before they expand enough to hide the calyx.

There are some properties, however, which apply to all roses, whatever be their characteristics in other respects, and, therefore, must be taken as an estimable point in the construction of a flower.

1. The petals should be thick, broad, and smooth at the edges.

Whether this be for a Moss, which is never to be shown fully opened, or the florist's favorite, which is to be shown as a dahlia, this property is equally valuable, because the thicker the petal, the longer it is opening, and the longer does it continue in perfection, when it is opened. There is another essential point gained in thick-petalled flowers: The thicker the petal, the more dense and decided the shade or color, or the more pure a white, while the most brilliant scarlet would look tame and watery if the petal were thin, transparent, and flimsy. Hence, many semi-double varieties, with these petals, look bright enough while the petals are crowded in the bud, but are watery and tame when opened, and dependent on their single thickness.

2. The flower should be highly perfumed, or, as the dealers call it, fragrant.

Whether this is to climb the front of a house, bloom on the ground, or mount poles or other devices, fragrance is one of the great charms which place the Rose on the throne of the garden as the Queen of Flowers.

3. The flower should be double to the centre, high on the crown, round in the outline, and regular in the disposition of the petals.

This would seem to be a little contradictory, after saying, that in a Moss Rose, the full-blown flower cannot be allowed, because it conceals the grand characteristic of the plant. But it is not contradictory, because we defend it on grounds which render doubleness equally valuable to the Moss family, which should not be shown in full bloom, as to those which are so exhibited. The more double the flower, even when amounting to confusion, the more full and beautiful the bud in all its stages. Those who have noticed the single and semi-double Moss Roses will remember that the buds are thin and pointed, and starved-looking affairs, while the old common Moss Rose, which is large and double as the Cabbage Rose, is bold, full, rich, and effective, from the instant the calyx bursts. At this point, we shall have to branch off and take families; perhaps the Moss Rose family is the best to commence with. Those who now follow through the different species or varieties, will find the first three rules are essential to all, and are therefore repeated with each division.

Properties of Moss Roses.

1. The petals should be thick, broad, and smooth at the edges.

2. The flower should be highly perfumed, or, as the dealers call it, fragrant.

3. The flower should be double to the centre, high on the crown, round in the outline, and regular in the disposition of the petals.

4. The quantity of moss, the length of the spines, or prickles, which form it, and its thickness, or closeness, on the stems, leaves, and calyx, cannot be too great.

This being the distinguishing characteristic of Moss Roses, the more strongly it is developed the better.

5. The length of the divisions of the calyx, and the ramifications at the end, cannot be too great. As the entire beauty is in the unde-

veloped bud. the more the calyx projects beyond the opening flower, or rather the more space it covers, the better.

6. The plant should be bushy, the foliage strong, the flowers abundant and not crowded, and the bloom well out of the foliage.

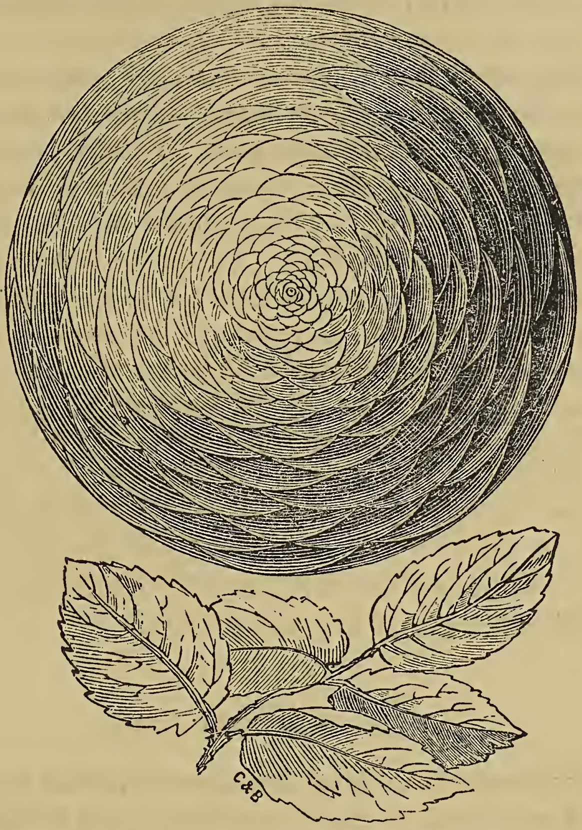


Diagram of a Fine Double Rose.

7. The color should be bright or dense, as the case may be, and if the color or shade be new, it will be more valuable; and the color must be the same at the back as the front of the petals.

These seven properties would constitute a Moss Rose a valuable acquisition, and probably, at present, the greatest acquisition would be a yellow one.

8. The stem should be strong and elastic, the footstalks stiff, so as to hold the flower well up to view.

Properties of Roses for Stands, showing the Single Bloom like Dahlias.

1. The petals should be thick, broad, and smooth at the edges.

2. The flower should be highly perfumed, or, as the dealers call it, fragrant.

3. The flower should be double to the centre, high on the crown, round in the outline, and regular in the disposition of the petals.

4. The petals should be imbricated, and in distinct rows, whether they be reflexed, like some of the velvety Tuscan kind, or cupped like a ranunculus; and the petals to the centre should continue the same form, and only be reduced in size.

5. The color should be distinct and new, and stand fast against the sun and air, till the bloom fail.

6. The stem should be strong, the footstalk stiff and elastic; the blooms well out beyond the foliage, and not in each other's way.

The very worst habit a Rose can have, is that of throwing up several blooms close together, on short stiff footstalks, some of which must be cut away before the others can be fully developed; as show flowers, they are bad, and as plants, they are very untidy. The side buds prevent the centre flowers from opening circularly, and when the first beauty is off, they exhibit dead roses held fast between two living ones.

Properties of Noisette Roses.

However singularly some catalogues class these varieties, we intend, by this name, to distinguish those roses which bloom in clusters.

1. The petals should be thick, broad, and smooth at the edges.

2. The flower should be highly perfumed, or, as the dealers call it, fragrant.

3. The flower should be double to the centre, high on the crown, round in the outline, and regular in the disposition of the petals.

4. The cluster should be sufficiently open to enable all the flowers to bloom freely, and the stems and footstalks should be firm and elastic, to hold the flower face upward, or face outward, and not hang down, and show the outside, instead of the inside of the blooms.

5. The bloom should be abundant at the end of every shoot.

6. The blooming shoots should not exceed twelve inches before they flower.

7. The bloom should stand out beyond the foliage, and the plant should be compact and bushy.

We now proceed to a family which we shall designate Climbing Roses, and which comprise blooms of the Noisette kind, that is, in bunches; blooms which come singly, large and small; flowers early and late; and, in fact, which comprise all sorts of roses that grow tall enough for training.

Properties of Climbing Roses.

1. The petals should be thick, broad, and smooth at the edges, with the outer ones curving slightly inwards.

2. The flower should be highly perfumed, or, as the dealers call it, fragrant.

3. The flower should be double to the centre, high on the crown, round in the outline, and regular in the disposition of the petals.

4. The joints should be short from leaf to leaf. The blooms should come on very short branches, and all up the main shoots. The plant should be always growing and developing its flowers, from spring to autumn, and the foliage should completely hide all the stems, whether the plan be on front of a house or on any given device.

Concluding Remarks.

Having now travelled through the chief of the families, which require separate notices of their properties, the first three properties numbered being required in all of them, we add, by way of a finish for all, except Moss Roses, that

The foliage should be bright green and shining, and, though not likely to be found in many varieties, it should be permanent, and constitute an evergreen.

By this, we mainly establish a point in favor of an evergreen. We mention nothing about size, because size forms the distinction between many roses which have no other difference, and has little or nothing to do with the properties of the Rose, except uniformity in the same variety.

PROPER SOIL FOR THE ROSE.

The proper soil for the Rose is strong rich loam, and well decomposed vegetable mould, cow dung, or horse dung; but as we are too often already provided with the kind of soil we are obliged to use and the gardens and situations for our roses are generally ready made, all we can do is to modify and supply the deficiency, if any, as well as we can. If the soil be light, holes must be dug, and loam and dung forked in at the bottom of the hole, as well as the hole be filled up with the same mixture; for troublesome as this may be, it is the only way to secure a good growth and bloom, and it is next to useless to plant roses in poor light soil without this precaution. Kitchen gardens well kept up, will always grow the Rose well, and unless the soil be very poor and very light, a good spadeful of rotten dung, mixed with the soil where the Rose is planted, will answer all the purpose. Among the evils of poor soil for the Rose, it is not the least, that it frequently makes the flower that would otherwise be double come single or semi-double, so as to destroy all identity of the variety by its bloom; and although many thousands of roses of no value have been sent out, many others which did not deserve it have been condemned, because the party who was growing them knew nothing about their cultivation, and starved them into a false character. As it is difficult, however, to give the Rose too rich a soil, it may be as well, even if you think it good enough, to work in a spadeful of dung with it; for it will do no harm, even if the state of the ground be ever so good. We have no doubt that the Rose would flourish in rotten turf, and when they are to be grown in pots, it is practicable to give them this invaluable stuff to grow in; but unless it be a recently turned-up pasture, there is nothing approximating to it out of doors, and even this is far less supplied with the rotted grass, than when turfs are cut thin to rot for use. As a general principle, then, may be laid down that the Rose requires rich soil; and that if you have it not, you must change the nature of what you have, by means of dung, or loam, or both

MANURES FOR THE ROSE.

One of the best manures for the rose is a mixture of one part of Peruvian guano, three parts charred turf and earth, and six parts of cow dung. A thin dressing of this should be pointed in with a trowel every spring.

Roses may also be watered at any period of their growth with a mixture of one fourth of a pound of Peruvian guano and eight gallons of water, to be applied with a watering pot in the evening or on a cloudy day.

PLANTING OF THE ROSE.

To plant the rose properly, the root must first be examined, and every particle of it that has been bruised should be cut off with a sharp knife just above the bruise; all the torn and ragged ends should be made smooth, and cut away as far as they are split or damaged. If any root has been growing downward, it should be shortened up; for it is better to discourage any from growing downright. This preparation being made, and the holes dug large enough to take the root in without cramping it, fork or dig up the bottom of the hole to loosen it, and, if necessary to make any addition to the present soil, to mix it properly with the soil taken out, and work it some way into the soil at the bottom. Let one hold the tree or plant, if it be too large to manage properly alone, and the other throw in the soil between the roots. By moving the stem backward and forward, and pulling upward a little, it is easy to work the soil well between the roots, and on this much depends. When it is adjusted, the top of the root must be pretty close to the top of the ground; there must be none of the stump or stem buried; and when trodden down, the root must be fixed steady and solid. If you have to manage the planting by yourself, you must, as soon as the hole is prepared, lay hold of the stem just above the root, and return the soil with your other hand, continuing to move the head first one way and then the other, until the soil has worked well between the roots, when it may be trodden in as mentioned before.

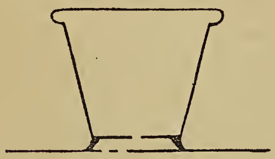
Dwarf plants there is no difficulty in planting, but you must be careful to keep the crown of the root near the surface of the ground, the treading in of all fair and solid being a necessary operation with all the kinds of plants. With the standard sorts you should drive stakes into the ground pretty firmly, and fasten the stems of the roses to them, to prevent the wind from removing them; as when your roots have been once firmly trodden in, you cannot move a tree one way nor the other without breaking the fine fibres, and thus lessening the capacity of the root to carry strength to the head. If you are planting a group of standard roses, you should place the highest in the centre, and the lower ones nearer the outside; in fact, a handsome clump of roses might have six-foot standards in the middle, four feet six inches in the next row, three-foot ones nearer the front, and eighteen-inch ones outside; these, if at proper distances, and with picked sorts, of something near the same habit of growth, will form a superb mountain of roses in the proper season.

Rows of Standard Roses may be planted with advantage on each side of a coach road, in a park, or on both sides of a path on a lawn, but at proper distances, so that each shall form a specific object in itself, as well as a portion of a row of rose trees. Roses also form very beautiful objects planted in isolated situations on lawns, and especially when the sort of rose is distinct from others, or blooms at different periods; for whatever forms a portion should be of a similar habit to the rest of the whole. Thus, if a particular walk in a garden or shrubbery were bounded by two rows of roses, they should all flower at once. If a clump of roses is planted, they should flower at one season. A mixture of spring, summer, and autumn roses would be very bad; the place never looks right; therefore some pains must be taken to keep all those which flower at the same period of the year together. One portion of the garden may then be always garnished with roses. and it is far better than having them straggling about, with here and there a flowerless one among those in bloom, or a blooming one among those not in flower.

Planting of roses which are on their own bottoms, or worked low down for dwarfs, or for climbers where flowering wood is always wanted from the ground, differs in nowise from any other planting except as to the situation, which should be chosen not too much exposed to the wind, as in the most sheltered spot they always have enough to encounter. They must be planted firmly, and in good soil; and whatever they have to climb up should be firmly placed by rights before they are planted, but certainly before they shall have grown much, as the roots spread a good deal, and if damaged by violence after they have begun to grow vigorously, they will receive a check which they may not get over the same season.

POTTING OF ROSES.

To the cultivators of the Rose, any improvement in pots is of importance. Those designed to grace a hall or a window of a dwelling, may be made in fine stone and earthenware of various patterns, and should be so constructed as to possess advantages over the common old red porous ones made of clay. One reason why plants potted the usual way do not flourish well in the house during the winter season is, the proper want of leakage, or drainage, and a due circulation of air about their roots, in consequence of the close connection between the bottom of the pot and the shelf or bench on which it rests.



Mr. M'Intosh, gardener of the Duke of Buccleuch, has obviated the above-named objection by making pots with feet, as denoted in the adjoining cut. By this means, the plants get rid of their moisture, and freely receive air about their roots through the hole in the bottom of the pot.

Potting Deciduous Roses for Forcing.

The nearer you can imitate planting in the open ground the better. The soil should be the same or richer, with dung chiefly, because you cannot water soil without washing away, in some measure, whatever it is impregnated with, that is soluble. By a parity of reasoning, you cannot moisten with water impregnated with anything, without imparting the virtue or mischief of the solution to the soil.

It is the best way to use half of rotted turf and half of rotted dung; if it be not too light to let water pass freely, add a little turfy peat, broken through a sieve that would pass a hazel nut. Trim the roots, to get rid of all bruises; and, in the first instance, choose plants, the roots of which are within a moderate compass, for pot culture, and are well taken up. Select pots that will receive the roots without much cramping; carefully put the soil between and among the fibres and larger roots; strike the pots on the potting table, and poke the soil down so as to be firm.

If the roses be dwarf, follow the directions about pruning at once, and let them be placed in a cold frame, watered, to settle the earth about them, and covered up. This should be done in the Southern and Middle States from November to February, when those for forcing should be put into the greenhouse, gently increased in temperature, well watered, and kept growing hard; any buds that show should be removed, and they should be allowed to complete their growth, and then be plunged in the open ground, and there the wood be permitted to ripen. When the leaves have fallen, and the wood is fairly ripe, they may be pruned, by removing all the weak shoots, and shortening the strong ones; the balls turned out to examine, and if matted with roots, pots a size larger be given. They may then be placed in a cold frame, plunged to their rims, until the period you want to force them. They will flower better the second year than they could have flowered the first, and if the blooms are all picked off again as fast as they show, instead of being allowed to perfect themselves, the growth will be more free; and by growing hard to complete it early, and leaving them out again to ripen, they will allow of being pruned into a handsome form, being carried into the house sooner, and will flower most abundantly, instead of having one or two sickly shoots with their miserable half-starved blooms. At the end, they will have as many as you please to leave eyes for, pruning them the same as you would standards or bushes out of doors, and the blooms will come as rich, as handsome, and as well colored as any in the open air. Roses may then be forced at almost any season, only they ought to undergo the same forcing a season or two without being allowed to flower, that they undergo the season they are to be forced into bloom. And this will answer season after season when they are once well established, for they require only the usual shifts of plants, which have their balls matted with root; but of the forcing, more hereafter.

Potting for Show.

As it is at length the fashion to show roses in pots, the only proper plan of showing any but single blooms, face upward, the plan of potting cannot differ from those potted for forcing. Presuming that if they are late roses and require forcing, they will be treated after the plan above mentioned, so far as the potting is concerned, the difference between what the perfectly hardy and summer or autumn blooming roses will require after potting, as we have directed, is to be put out in an open situation; and if standards, they should be fastened to a railing, or trellis, as well as being plunged in their pots, that the wind may not disturb them. Here they may be protected various ways: a mat thrown over the head of a rose protected it, though not a very hardy one, against the last winter's frost. A wisp of straw tied at one end, and opened cap-like over each and among the branches of roses, protected them a good deal, and probably, had they not been autumn pruned, might have protected them entirely from mischief, but as it was, some of the pruned branches died back, though the unpruned ones did not.

Potting the Small, the Smooth Wooden, and Chinese Varieties.

Here, from the first, the soil should be one third rotted dung, one third peat, and one third the loam of rotten turf. In this stuff, the most delicate will succeed. From the period of their having struck root, they can hardly do wrong if potted in this soil, in a proper-sized pot, with ordinary drainage. Small plants should be placed in pots no larger than the roots require to hold them, with a moderate share of earth to live in. This kind of rose should be kept growing in a cool frame or greenhouse, or pit, with not much moisture; plenty of air in dry mild days, and a refreshing shower when it is warm. It is safer to plunge them in ashes, if you can, up to the rims of their pots: it keeps them moist longer than if the pot is exposed, it mostly does, in bad weather; and though it perhaps does not kill them, it makes them weakly for some time. In this way, they may grow from time to time, and be shifted from one sized pot to another, requiring only that the buds should be plucked off directly they show, so long as the plant is wanted to grow fast.

FORCING OF EARLY ROSES.

THIS art consists in bringing the Rose, by degrees, out of its season, as we have half explained under the head of "Potting for Forcing." We know that a Rose can be potted in January, and made to produce flowers in May; but those who wish to force should know the best way.

A Rose, then, for early forcing, requires three seasons to be perfect. The first season, it should be put into a greenhouse, and from thence into the stove, as early as November. It is sure to grow, no matter what sort it is; and let it grow its best, but pluck off the buds if it have any, yet it should not be drawn; this can be managed two or three ways, but it requires, to prevent drawing, light and air. These will have grown pretty well as large as they can grow, by the time they may be turned out and plunged in the open air. The wood will ripen well in the summer time; and in October, re-pot them into a size larger pots; prune them by taking off all the weak shoots, and all the least valuable of those in each other's way; shorten the best wood to two or three eyes, thinning the inner branches all that may be necessary to give air, light and freedom to the new wood. Take them into the greenhouse, thence, soon, into the stove. Let the bloom buds, as they appear, be plucked off, and the growth to be perfected again, which will be earlier than the previous season, as they were set growing earlier. Be early in your attendance on them, when they commence growing, so as to remove useless buds, instead of allowing them to form useless branches. When the growth is completed, remove them into a cold frame, to be kept from the spring frosts, but where they can have all the fine weather. In this state, they may remain till they can safely be put out in the open air, plunged into the ground, and properly fastened to protect them from the wind. In September, you may examine the balls of earth, to see if the roots have room; if matted at all, give them another change. Prune the plants well, as before removing altogether such of the present year's shoots as are at all weakly, and shortening all the best to two or three eyes. Let them now be taken to the greenhouse, or conservatory, or a grapery, or all in turn; but gradually increase the temperature, till, by the end of October, they may go into the forcing house, beginning at the temperature the house was that they came from, say fifty to fifty-five, and continuing it till they are fairly growing; then increasing it to sixty, and eventually to sixty-five; rubbing off, as before, all useless shoots, and giving plenty of air, when it can be done without lowering the temperature. At the least appearance of the green fly, syringe with plain water; fumigate at night, for too strong a smoke would all but destroy the plants and incipient blooms. In this way, you will be clear of the pest without damage, and your reward will be a fine show of blooms on every rose tree; strong growth, healthy foliage, handsome plants, and all that can be desired.

Forcing Later Roses.

The principle on which the early forcing is conducted must be carried out in full, not only in potting the plants then pruning, but also in the period of removing them. If you wish those a month later to succeed the first, put them into the house a month later, each of the years. If you want others to succeed these second, put them into the house a month later still each year. For nothing has been shown yet in the way of pot roses, better than were shown several years ago, and all of them have had a weakly drawn appearance, and have been anything but creditable to the taste of the gardeners; for they have been staked all over, and thin, flimsy roses on limp-lankey stems, bound up to a thicket of unnatural wood. Now, by the plan we have been recommending, the plant is longer growing, stronger in its wood, shorter in its joints, and more abundant in branches, foliage, and flowers. The ordinary mode of forcing contemplates no more than removing a plant from out of doors to in-doors in one year; so that, without having the advantage of premature ripeness for two seasons, or even one, it has to perfect its flowers before their time, by great excitement, with a root hardly established. We hold that a Rose, like a grape vine, cannot, after bearing in the usual season, be changed all at once to early forcing, without great sacrifice of crop, strength, or beauty. The fact of sudden excitement being fatal to a Rose is demonstrated easily enough by the result; take a stong plant, well established, from the cold atmosphere and temperature of the ground, into a full-heated house, and every bloom will be blighted in its incipient state. If a decided change like this is universally fatal, which is the fact, every sudden change, and all approaches to it, are proportionally mischievous. We do not, however, mean to say that roses cannot be forced in a single season, because thousands are so forced and sent to market; and the usual result of such management is, three or four long-drawn branches, with a bud or two at the end of one, and sometimes of two, with scarcely strength to open into a flower. There are exceptions to the choice kinds of roses; in these remarks, we allude only to garden roses. The China kinds are of a different nature, always growing and blooming; winter and summer, if they are kept in a moderate temperature, are almost alike to them, and those which partake of their habit.

The Forcing of Roses—the Dwarf China Kinds.

This family has scarcely any rest in pots, and under protection, it may be merely kept over the winter. There is no place so well adapted for them as a cold pit, with a good dry bottom, and shelves near the glass; but a stout shallow box, with a regular garden light on it, placed high and dry on a paved, slated, or warm, gravelled bottom, makes a good shift.

The China Rose, and all the short-jointed, smooth-barked kinds that are like them in habit, will strike, bud, graft, grow, and bloom any month in the year. The only thing necessary, is to have plants in all stages, and there will never be any want of flowers. In the greenhouse, they continue growing on, and blooming at all times; but they cannot be kept too cool generally, and if abundance of flowers are required on a plant, it must have a previous rest, and be shifted to a warm temperature, and if matted in the roots, a lagre pot, and the heat gradually increased until it will bear that of a moderate stove. All the new growth will flower about the same time, or at least sufficient of it to well decorate the plant. Cuttings may be struck in the spring, planted out in beds six inches apart, to grow a little; the tops may be pinched off, and the buds taken away all the summer, to make them bushy; and they may be potted up with a compost of half loam, a fourth peat, and a fourth cow dung; trimmed a little into shape, and placed in the shade a while. In September, they may be put into their frames, covered up at night against frost, and opened in mild weather, until the ground freezes; they may then be removed, a few at a time, into an increased temperature, and about a month apart. They will be found to bloom well, and succeed each other admirably, all through the winter and spring, before those out of doors can even fairly start into leaf; the only care required being to syringe them against attack of insects, and if that does not keep them under, fumigate them; and see that they never suffer from want of water. These, however, like the Summer Roses, will force better the second year than the first, by shifting them into pots a size larger, trimming the plants into a proper shape, taking away the weak shoots, letting them rest, and giving but little water towards the end of the summer, except to keep them from actually flagging; putting them in their frames and removing them into heat, as before, a few at a time, and a month apart.

PROPAGATION OF THE ROSE.

The Rose is propagated by seeds, by cuttings, by layers, by suckers, and by budding or grafting.

Propagation from Seed.

This mode is adopted for the purpose of raising new varieties by crossing different kinds, and is almost exclusively practised by professional florists; it is also employed for obtaining Sweet Briers and stocks. When the seed is gathered in the autumn, it is either rubbed or washed out of the "hips" and kept in dry sand; or the hips are laid in a cool room, and turned over from time to time, till the shell is rotted; the seed is sown in the succeeding spring, after which it will come up the same year.

Sowing of the Seed.—Among the numerous modes of sowing the seed of the Rose, strange as it may seem, the very plan which has been adopted for fifty perennials, or perhaps more, answered as completely as any. For instance, Polyanthus seed and Rose seed were sown in the same kind of soil, loam and dung, in the same sort of pan, placed in the same garden light, watered at the same time; and, though coming up at a different period, submitted to the same treatment in other respects; shaded from the same noon-day sun, and, though at a different time, pricked out into pots, four or five in a pot, round the edge; kept cool, and growing right on; and when the Polyanthuses were placed in their single pots, the Roses were also potted in theirs. They were kept dry rather than otherwise all the ensuing winter, in a cold frame, with their neighbors, well protected against frost; and that was all.

In the spring, when they began to grow, they were bedded out in rows, in a shady border, six inches apart, and the rows a foot apart, and here they remained another season, making considerable growth; some were of the China kind, and those were potted up and kept growing; the others were hooped over with low hoops, which kept the covering close down on them in bad weather, and there were several that died during the winter. In the spring they were pruned carefully, so far as to remove all but the two or three strongest shoots, and those were cut about half way back. Several bloomed weakly, but most of them made good growth. No part of the success, however, went beyond the growth; not half a dozen came at all double, and though there were some bright colors, there were none in our estimation worth saving. The China ones were rather better, but not good enough; so that, after giving a few of the best another year's chance, every vestige was given or thrown away. The experiments followed up season after season led to the following confirmed practice:—The berries were dried all the winter; they were then bruised in a bag, and the seeds carefully picked out; a slight hot bed was made up as if for annuals; the soil put six inches deep all over, half-rotted turf and half cow dung, raked smooth, and the seed sown evenly and thinly all over—occasionally moistened; the seeds came up well, and were shaded; had plenty of air given, and the usual attendance to see that they were not dry, but not much watered. Here, as soon as they were large enough, they were thinned a little, by carefully removing a few wherever they were too thick, which removed ones were as carefully potted off and kept in the greenhouse. They had no other care during the season than protecting them from too much sun; but they were allowed to be quite open on mild cloudy days, and had warm showers of rain at all opportunities. Here it was found necessary to fumigate them several times to get rid of the aphides, which partially appeared five or six times during the season, but were speedily cleared away. The lights were taken off towards autumn, and the young plants looked as well as could be wished. At the period when frosts were expected, they were removed carefully with all their roots, into a bed made of the same compost, and a foot deep; planted a foot apart every way, and the bed being four feet wide, took four across it, the outer ones being six inches from the edge of the bed. The same precaution was taken with mats and hoops to keep off heavy falls of snow or hard frosts, and they were allowed to push as much as they would, without pruning, all the next season, no other pains being taken than to throw the mat over when the sun was distressingly hot, and to water them freely on dry parching weather, every night. At the autumn, they were replanted, all the weak shoots being cut out, but the strong ones not shortened till spring. Though there was a manifest improvement in the flowers each season, it was four or five before anything like the quality of some present roses was approached.

This practice differs, in some respects, from that of some other nurserymen; we have seen healthy seedlings, since all these pains were taken, where the seeds were sown out of doors in a common bed, raked in like so many onions; came up like so many weeds; grew well and stood the weather without even a shelter from hard frosts. Some may have been killed and not missed, but they did as well, to all appearance, as those more tenderly nursed.

Hastening the Flowering of Seedlings.

When the seedlings come up in May or June, keep them well moistened, but not too wet, until you can get hold of them well to pot off. Put one each into small pots, and let them, as soon as they are established, be placed in the shade out of doors; but the greatest care must be taken to prevent the attack of the fly, or vermin of any kind. They must be looked at almost daily, and upon the least appearance of any insects, you must remove the plants under cover, where you can fumigate and syringe them regularly. It is still better, if you have frame room, to put them in when potted, because it gives an opportunity of shading, of keeping off too much wet, protecting them against wind, and of fumigating without the least difficulty, when necessary. They should, however, seldom have the glasses on.

After the seedlings have been five or six weeks in these pots, they may be bedded out, in rich beds of loam and dung, without disturbing the balls; they should be about a foot apart, in beds of four feet wide; by planting within six inches of the side of the bed, four rows will go in, and they will here grow rapidly. Before the close of the budding season, many will have grown quite large enough to bud from; and the most promising may be cut back, and three or four buds put on remarkably strong stocks. Select a strong branch for budding on, and at first, you must let some portion of the branch beyond the bud be left on to grow; a very small shoot beyond the bud will do to insure the growth. These buds will strike off vigorously the next season, and make considerable growth; but before the bud has shot far, cut the stock away everywhere but the portions budded on. The growth they will make this summer on strong stocks will insure their bloom the next season; and, as the real object is to see if the Rose be good for anything, they should not be pruned, except so far as to cut away weak branches altogether; by leaving the full length of the strong shoots, the blooms will be hastened.

In the mean time, those in the bed may be treated as directed; and though not generally the case under the present management, they have bloomed these years on their own bottoms, though there were a great number much later than the third year, and some even went to the fifth. This mode of budding the promising seedlings hastens the certainty of bloom very much, as it is very rare indeed that they miss coming the third year. If they are worth propagating, the budding greatly increases the quantity of wood to work from. If, on the contrary, they turn out good for nothing, the instant you discover it, cut away all the wood, and the stocks will, in all probability, grow in time for budding other sorts upon the same season you discover the deficiency of those already worked. In this way, without incurring much trouble, you may satisfy yourself as to the quality of seedlings for a certainty the third year; therefore, you should provide yourself with stocks for that purpose, whenever you sow seedlings. For China sorts, you should have some stocks of the common China, or Boursault, or the Dog Rose, in good-sized pots, and well established; for they may be budded later, protected better, and indeed some of the seedlings which partake much of the China are tender, and really require protection from the frost.

Retarding the Flowering of the Rose.

The most simple method of retarding the flowering of the Provence and Moss Roses, so as to have the plants in bloom late in autumn, is to cut off the tops of the shoots produced in the spring, just before they begin to show their flower buds; the effect of this treatment will be to cause the plants to throw out fresh shoots, which will bloom later, according to the period in which the operation is performed.

It may also be done by transplanting the bushes early in the spring, as soon as they have formed their buds, which should be cut off. The roots must not be allowed to dry before they are put into the earth again; and they will require artificial watering if the season should be dry, to make them flower late in the fall.

Propagation by Cuttings.

When the earliest shoots of the China Rose are about four inches long, cut them off close to the old wood, plant them in pots half filled with soil, and plunge them in a warm situation, placing over the pot a flat piece of glass, to exclude the cold air; the glass should be wiped occasionally. Thus treated, they will make blooming plants by autumn.

Indian Roses, and climbing kinds, are also easily propagated by cuttings and slips, protecting them as above, or by a hand glass, when the climate is cold.

Propagation by Suckers

Many roses, indeed most of them, growing on their own roots, instead of by grafting on a stock, constantly spread at the roots, and branches force their way up, much to the annoyance, sometimes, of the men in charge of the rosary. In the spring months, their suckers should be looked for, and when found, they should be taken off at once, far enough under ground to get a piece of root with them. These should be replanted instantly on the removal; but if a piece be planted out, and devoted to propagation, the proper method is to dig up the plants in autumn, tracing the roots as far as they go, and taking the portions which have been growing above ground out at the same time. Some kinds will have half a dozen, or more, perfect plants, which have been formed by the spreading at the root, and the end growing up through the surface. These suckers should be trimmed and planted carefully, at such distance as the sizes warrant; generally in rows a yard apart, and the plants eighteen inches from each other. Here they have to be cut down in spring to within three or four eyes of the ground.

Propagation by Layers.

The Rose will propagate from layers. To do this, some merely select a lower branch, and, bending the wood sharp between two joints, peg that down under ground in autumn; it will root well by the following fall. Others cut a notch in the wood, on the upper side, which makes the bend sharper; but there is more danger of breaking it. Another method is, to run a knife through the wood, so as to split it, and then give the wood a little twist; but most of the sorts will root if only pegged under the surface. That, however, is rarely resorted to; and when it is considered what facilities for propagation are offered otherwise, it is no wonder. The laying should be done as soon as the wood has ripened, and the pegs to be used should be like a miniature hooked walking stick, which it is easy to form out of any branch of wood. This hook is thrust into the ground firmly, to hold fast the whole winter and summer season.

In dry weather, the layers should be watered, as the trees themselves, or bushes, frequently prevent the rain from coming near the surface, where the branch is pegged down, and they would in such cases have no encouragement to root. In the autumn of the next year, examine them all before they are cut off from the parent root, and if rooted, of which there will be little doubt, cut the new plant away, with all the new root; and in planting it out in another place, shorten the portion above ground to half its length; and at pruning time, in the spring, cut it down within three or four eyes of the ground, in order that it may form a bush.

Layers of some roses strike almost immediately; and from this facility, it is a common practice to lay them all over a bed by pegging down the branches on the surface, at small distances, and thus cover a whole space, which have rooted at almost every joint. The flowers, in such cases, are very strong; but a bush thus treated, and every branch layered, would cut up into an immense number of plants.

Propagation by Budding on Briers.

> We marry
> A gentle scion on the wildest stock,
> And make conceive a bark of baser kind
> By bud of nobler race; this is art
> Which does mend nature—change it rotting; but
> The art itself is nature.
> SHAKSPEARE.

There is no process in the art of Practical Gardening more interesting, nor the fruits of which are more gratifying to an amateur, than budding. The theory is this: At the base of the leaf is a small bud, which, after the leaf falls away from it, becomes prominent, and eventually, if left on the tree, makes a branch. By taking a leaf off with part of the bark, this incipient bud comes with it, and by inserting this bark under the bark of another rose tree, say one of these common briers, it unites as if it were originally a part of the brier itself; but the bud retains all the character of the one it came from, and is not changed in the smallest degree by the transfer from its own to another stock. This is the fact upon which all propagation by budding is founded; and, therefore, we have two leading points to consider in setting about this operation.

First, we must have the green bark of the stock, into which the buds are to be inserted, rise easily, which it does all the while the branch is green and growing; and, secondly, we must wait until the bud, small and almost imperceptible as it is at the base of the leaf, is old enough to be removed with safety. In a general way, the buds of Summer Roses are not ready till nearly mid-summer, and the bark will not easily rise from the wood of the stock much after that. The budding season may, however, be called from the middle of June to the middle of August, and not very much longer. What is meant by the bark easily rising is, easily leaving the wood, so that it would be easy to peel a branch by stripping the bark off.

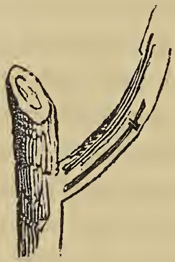
The first thing, then, to look to, is to obtain branches of the rose tree from which we want to produce other plants. If you obtain these branches before you are ready to use them, plant the thick end in the ground, and do not let the sun come near them, as it would soon destroy them; but they ought not to be an hour longer than you can help unused. Get some bass matting for ties, or very coarse worsted, which some prefer, because it gives way better if the bud swells, and will stand the weather longer. With a very sharp knife, called a "budding knife," if you have one, and, if not, any other, and a thin piece of hard wood or ivory, like a diminutive paper knife, you may go to work. The knife is to slit the bark down to the wood wherever you mean to put in the bud, and the piece of hard wood or ivory, with a sort of blunt edge like a paper knife, is to divide the bark from the wood by running it along under the bark, on each side of the slit.

Stocks for Budding and Grafting.—The great call for these articles has made it somewhat difficult to procure them anywhere but at the nurseries; and when you consider you can pick and choose at some price or other, the nurseries are the best place for an amateur to purchase. In some parts of the country, the briers are plentiful, but they are mostly in hedge rows, and it is somewhat perilous work to grub them up without permission; nevertheless, many men get their living by collecting these for the nursery grounds. The stocks should be procured at the fall of the leaf, and be straight, strong, well rooted and compact. These should be placed in rows, eighteen inches apart from each other, and three-foot or three-foot-six-inch vacancies between the rows; they should be staked, or, which is better, stakes should be put at equal distances, and a rail along them, to which rail all the stocks should be fastened by strong ties, the whole being well trodden in after the manner that new roses are planted.

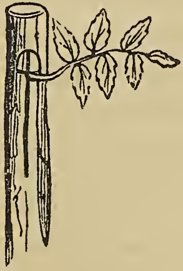
The preparation of the roots should be in all respects the same, and the stocks are generally shortened before you get them to the height their growth best adapts them for. Here they remain till they begin to push in spring, when all the lower buds must be rubbed off, leaving the three or four that are highest up the stock to see which will grow best. It will be found that some of these stocks have died down to a considerable distance; but as they are not of the slightest importance above the top growing bud, you may, with a strong knife, cut right down to the bud, or leave it till after the summer growth of the buds has considerably advanced. If you have one good branch, it will do, but two on opposite sides are better, because you can work both, and be safe if one fails. Several times, you must go over these stocks, to rub off the fresh buds that will be springing out on different parts of them, where they are not wanted; and two good buds near the top are all you need save. You have to remember that all the strength of the plant will go into these two branches, if the others are taken away; but that every leaf that is allowed to grow, besides those wanted, takes greatly from their strength, on which strength the value of the plant entirely depends.

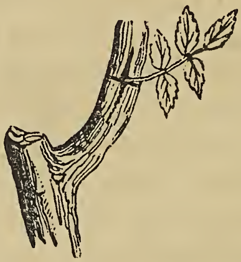
If the top shoots or buds happen to be weak in the first instance, compared with some lower down the stock, it is better to rub off the top, and lose a little height of the stock, than trust to dwindling branches, so that, in this case, your two branches to save might be half way down the stem; and it is better, in such case, to down at once to it, that the top may be no more trouble, and may not mislead you, in going over them a second time, to cut or pull out your best branches; for the top, so long as you leave it on, would be throwing out its green shoots; and being the same height as the general run of them, nothing is more likely. All that is to be done, besides keeping the stocks from throwing out other branches, is to cut away from the roots any suckers that may come up, and which distress the stock nearly as much as the dwarf branches. The ground, of course, is to be kept clear of weeds until mid-summer, which is the season for budding, and which is the next subject for consideration.

Being thus provided, go to your stocks with your branches of the trees you want to propagate, in your apron; for you ought to have front pockets, and the bass matting should be tucked in the apron string; take hold of the stock firmly, and shorten both the branches to a foot, or even less; then with your knife, cut a slit in the bark, within half an inch of the base of the branch upward, and on the upper side, an inch and a half long; about the middle of this slit, make a small cut across; then with your ivory, or thin wood—or more properly, if you have it, with the handle of your budding knife—raise up the bark on both sides; then take the branch of your rose tree



from which you take your buds, and with your sharp knife, shave out of the branch a thin piece of the wood, beginning half an inch below a leaf, and taking the knife along to come out half an inch above the leaf. This small bit has to be inserted under the bark on both sides, bringing the leaf, which is where the bud is, to the exact place where the cross cut is; when it is neatly inserted, take your piece of matting



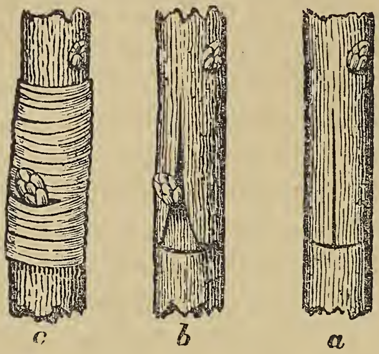


and place the middle of it across the slit just under the leaf; pass it under, and cross it backward and forward along the branch till the bark is completely tied down close, and only the leaf and bud exposed

As the weather at this time is often very hot, it is a good plan to tie a bunch of loose moss over all, and water the moss occasionally the first few days, because it keeps off the burning sun, even if dry, and greatly preserves the newly-disturbed bark. It will be easily seen that the quicker this operation is performed the better; because, if the sap of the bud, or that of the raised bark, has time to dry, the union of the one with the other cannot be completed with any degree of certainty.

The bark being damped immediately by the application of wet moss will hardly undo any mischief already done; so that a sharp knife, a clean cut, and rapid action are necessary, and can hardly fail. If the bud is cut out of the branch too thick, and too much wood is taken out with the bark and bud, the wood ought to be cut thinner, or pulled out from the bark of the bud altogether; but there is danger in taking out the wood; for it will occasionally bring out the germ of the bud with it. The effect of this would be, that nothing would indicate outside what was wrong, but the bud would not grow. It would look as green, as fresh, and as completely united, as if the germ were there. On this account, you may omit the practice of taking the little bit of wood from the inside of the bud, and with the greatest success. This operation should be carried through all the stocks, if you have plenty of buds on each of the branches; because two buds will make a head sooner than one, and if you choose to do so, you may put two different sorts on the same stock. In this case, you must be particular about having two of about the same habit; for a fast-growing one would soon deprive a slow-growing one of all the necessary nourishment; and, besides this, it would grow incongruously, and would not be controllable. On the other hand, if you have two of similar habit, and opposite colors, it may be made a very pretty object. But the great value of this delicate, though simple operation, is to make an old China, or other strong-growing Rose, long established, change its face altogether. Many kinds of roses may be budded on such a tree, by selecting all the strong-growing branches of the present year's growth, putting a different bud in each, and cutting all the other parts of the tree away, leaving the novelties alone to grow; or the buds may be all of the same sort, so it be some choice kind; but different colored roses have the best effect.

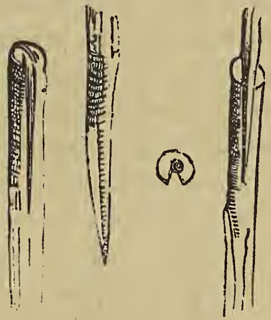
Spring Budding.—But one of the most sure and expeditious methods is that called "spring budding," by which the bark of the stock, as early in the season as it will separate from the wood, is cut like the letter T inverted, (thus, ⊥,) as shown by *a*, in the adjoining figure;



whereas, in "summer budding," it forms a T in its erect position. The horizontal edges of this cut in the stock, and of the "shield bark" containing the bud, should be brought into the most perfect contact, as denoted by *b;* because the union of the bark in spring takes place by means of the ascent of the sap; whereas, in summer budding, it is supposed to be caused by its descent. The parts should then immediately be bound with water-proof bass, (*c*,) without applying either grafting clay or grafting wax. The buds may be inserted either in a healthful branch, or in a stock near the ground. In general, two buds are sufficient for one stock, and these should be of the same variety; as two sorts seldom grow with equal vigor. The bass ligature, which confines the bud, may be removed, if the season be moist, in a month after budding; but if it be hot and dry, not for six weeks at least. As soon as the inserted buds show signs of vegetation, the stock or branch containing them should be pruned down, so as to leave one or two buds or shoots above. If the stock is allowed to have a leading shoot above the inserted buds, and this shoot is not shortened, the buds inserted probably will not show many signs of vegetation for several weeks.

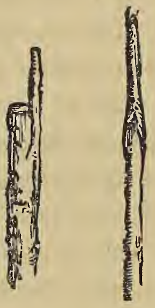
PROPAGATION BY GRAFTING.

This is by means so simple an operation, though not a very difficult matter; nevertheless, the pith in the centre of the wood is against it, as well as the discrepancy in general between the stock and the scion. The act of grafting is adopted for the same purpose as that of budding—to propagate particular varieties. It is not so safe nor so certain a mode as budding, but in the spring, there is no other means; and as in the purchase of new roses, there is generally a good deal of ripe wood that must be cut off, those who have stocks that are fit for grafting frequently adopt it. There are various modes of performing this operation; one or two ways are applicable to the old wood of the stock; other modes are adapted to the last year's branches. In the one case, a cleft is made in the stump of the stock, and the wood belonging to the new Rose to be inserted is cut in an angular form to fit it. It is then bound in its place by bass matting, or some other tie, and the joins covered with grafting clay, or, which is more generally used for roses, grafting wax; a composition formed of beeswax and resin, in equal parts, and a little tallow, to render it easily fusible at a low heat, because the real object of this wax is to melt at a heat which will not hurt the trees, but that will, on cooling, be sufficiently hard to keep in its place, and bear even the heat of the sun without running away.

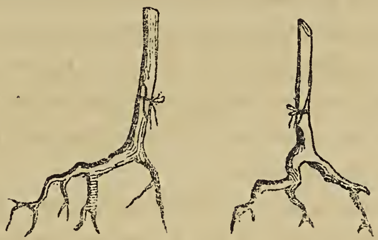


There are various modes of grafting the smaller branches of the stock; that is to say, the branches of the last year's growth. One mode is, to cut the branch down to two inches in length, and then cut this short piece down the middle, cutting out the inside of the wood sloping outward, so as to receive a wedge-shaped graft, which should be about the same size, if possible; cut this into the shape of a wedge, and insert it in the stock, making as complete a fit as possible, and be careful that the bark of both scion and stock exactly join on one side, whether it reach the other side or not; for, unless the barks meet on one side, it will be impossible to unite. It will frequently happen that the scion is smaller than the stock; the one must be used as you have got it, the other you must get as good as you can; and when you have it, make the best of it. Others, in grafting, cut the branch of the stock into a wedge, and the scion is cut to receive it. The effect is the same in the end, if well done, and in good grafting, the joint is soon lost in the growth.

There is one advantage in grafting in spring: If it takes, you may have roses the same year, and thus a season is saved; but, if any of them fail, the stock will grow, if the graft does not; and, of course, if the graft does not grow, you must allow the top branches of the stock to grow, and rub off all other buds, just as if it had not been grafted. The China kinds will graft at any time of the year, but they must be on China stocks, or stocks partaking of the nature of China stocks. It is only the deciduous kind of stock which is confined to the spring grafting, and it is not uncommon to see the solid stock of a large size cleft to make room for a small bit of choice wood; they holding it to be a waste to throw away the prunings of the Rose, and giving much attention to the profitable use of them.



Root Grafting.—It will be always found in a plantation of roses that suckers spring up in abundance from the roots; these would soon rob the head or worked part of a great portion of its nourishment; but these suckers are useful when taken off with a good portion of root to them, because there is not a more certain mode of propagating the Rose than neatly grafting a piece of the wood of a Rose on the root just under the surface; the union is almost certain, if at all dexterously



done. The proper mode of doing this, is to pull up the sucker, which will expose the root some distance, and take off a good piece of root with it from the parent stock; cut the sucker completely off to the part that was on the surface of the ground; get a piece of the wood of a Rose as nearly the size of the root as possible, cut a slit in the root, making both cuts smooth and flat inside; then cut the scion wedge fashion, and make the bark fit it even with the outer cuticle of the root; tie them well together, and plant them so that the entire graft goes under the surface of the ground. These root grafts are excellent for dwarf plants, for they are worked actually under ground, and when well done they make excellent plants. Grafting the Rose is not chosen before budding; but, as there is always a good deal of waste wood in a rose tree that has to come off in spring, many give grafting a chance; and of grafting, root grafting is one of the most effective. There is never any scarcity of roots among a collection of roses; forking the ground a little brings up these straggling shoots; and so that there be a good piece of healthy stuff, there is no difficulty in making a good job. There is no occasion to clay over the join in root grafting.

There is another advantage in root grafting: it is applicable with the China kinds all the season through, if you make sure of a healthy root; nor is there any difficulty in obtaining proper roots for the purpose. Wherever a sucker comes up through the ground, use a fork and take up as much root as you think suck a plant ought to have; the operation must be performed quickly, and with a very sharp knife, for the root must not dry under the operation, and they must be planted directly. The graft need not be put in wedge fashion; any other way is as good, if the join be smooth, well fitted, and tied firmly. But we do not recommend grafting of any kind as the best means of propagation. Nothing is so simple as budding, and scarcely anything so efficacious. The propagators of roses by root grafting are very apt to grow the suckers in pots for a considerable time, so that they get completely established after being broken away from the parent root, before they are submitted to the operation of grafting, and this becomes then almost a matter of certainty; whereas we have known the roots of suckers bleed so much, that they have lost the root, and have been indebted to the graft striking root for not losing it altogether.

PRUNING.

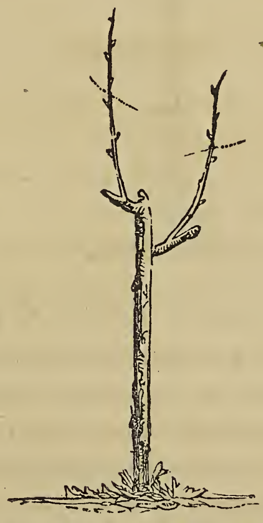
The principal objects to be attained by pruning roses are—first, to compensate, by reducing the part to be nourished, for the loss of the root that has to nourish it, which loss, greater or lesser, is always suffered by removal. The proper way to do this pruning depends much on the state of the plant when you have planted it. If it be very bushy, cut away all the weather branches, leave not more than three or four of the best of the shoots, and shorten even those down to a few eyes. If you wish the plant to continue dwarf and bushy, you may cut down to the last eye or two of the new wood, but leave no thin half-grown shoots on at any rate. If the plant is a matured bush, with numerous branches, and pretty strong generally, shorten the new wood down to two eyes, which will show what more you need do. It may be found that you have then a great many more branches left on than you require; cut one half of them close off, and that half must be the thinnest; but it may be that the plant will be improved by cutting some of the main branches clear away, and all that are on it; for rose trees and bushes, like everything else, are easily spoiled by bearing too much wood, and being over-crowded.

The regular Climbing Rose is often required to make as much show as possible the first year of planting; but unless they are removed with the greatest possible care, they ought to be cut almost to the ground, and thinned out also. None but the strongest wood ought to be allowed to remain on the plant, and if this be not of quite first rate excellence, it is far better to cut out all the weak branches, and cut down the strong ones to two eyes each.

Pruning Standards,

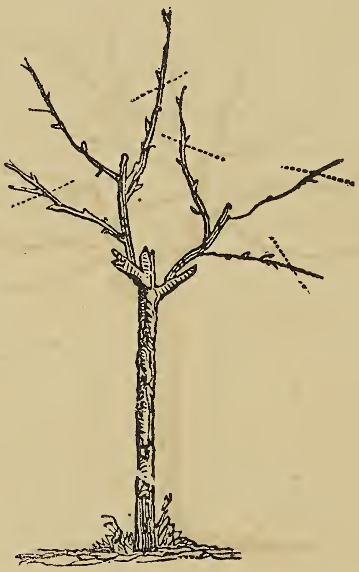
With regard to Standard Roses, we cannot help thinking, from all we have seen practised, that a large portion of them are grown altogether upon a wrong principle. Standard trees, to be handsome, should be as wide in the head as their entire height; and upon the present system of pruning them, they enlarge a little every year.

When your standards are planted, you need do nothing to them until April; then cut all small shoots off close; that is to say, clear them right away; cut down the strong ones to two, three, or at most, four



FIRST YEAR'S GROWTH OF BUD.

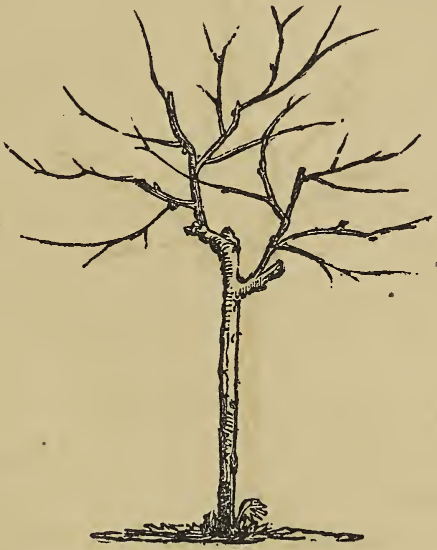
eyes. care being taken that the top eye is pointing onward; the object of this is to obtain strong branches growing outward, to make a wide head. As the shoots grow, notice the best and strongest that are growing in a position to widen the head, and leave them to make all the growth they can; allow any shoot that is growing up strong in the centre to grow also; and further, a most important point, rub off, or cut off with a very sharp knife, all weakly growing shoots, all that grow inward and cross the head, and wherever two cross each other, remove the weakest. The branches that grow outward will be good enough and well enough in one season's growth to leave any length you please towards making a proper sized head; but as five or six of these branches will not make a full head, the next season they may be shortened to half their growth, taking care that the end bud must be an under one, for all the tendency of the Rose is to grow upward, and it is only when the natural growth is outward, or downward, that the weight prevails to keep it in a horizontal or drooping position. This second year, and indeed every subsequent year, every branch that does not assist to form a handsome head without crowding, must be taken



SECOND YEAR'S GROWTH OF BUD.

away, and the younger it is when taken, the more good its removal does, because the other branches get the better.

With regard to any one or two, or even three upright branches, though one strong one is worth three weakly ones, they may be shortened down so that two or three good eyes may be fairly above the other branches, and that when they grow outward the next season, they may help fill up the head of the tree above; when the eyes begin to shoot, rub out all that come where they are not required, and leave those of which you are yet doubtful, as well as those you know will be wanted, because it is at this period you have such control by driving the whole strength of the tree into the branches that are wanted. In this way, you proceed until the head of the tree is the proper form and proportion, instead of, as we now see them everywhere, a small, pimping, ungraceful head to a tall stem, or trunk. When once it has arrived at this perfection, which, with very little care and attention, it will, you may cut back every year's wood to two eyes; cut out every weak shoot altogether, if you have not rubbed it off in the bud; cut out all that are in the way of free growth for the rest, and when any portion is confused by reason of the number of



Third Year's Growth of Bud.

spurs or shortened branches left on, clear away a bit by cutting them off. Always remember that Standard Roses for appearance should not be too closely pruned; but for showing, when the individual blooms are shown, a multiplicity of flowers is against size. We can hardly recommend too strongly the necessity of what we shall call spring pruning, which is, in fact, nipping the mischief in the bud, watching the development of the newly coming branches, and removing all but the number there is good room for; and as this has not been treated of at any length, if at all, we may fairly request attention to it.

The three cuts which are in illustration of this article, though not very accurate, show the first year's growth of two buds placed in a stock, with dotted lines at the place we should cut them; the second year's growth after such cutting, with dotted lines where we should cut them again; and the third year's growth is indicated by lines which give some idea of it. But neither of these cuts is exactly what we like; first, because our pen and ink sketches were imperfect, we being unable to draw exactly what we wanted; and secondly, because the artist, who could have drawn it, did not know what we wanted. There is enough, however, done to assist in our lesson on Pruning Standards, though not to the extent we wished.

Pruning and Training Pillar Roses.

Although we have touched on the pruning of bushes, and upon the pruning of climbers when first planted, it only related to the mere operation of pruning them for growth, in the position they were to remain; and here, for the sake of the poor roses themselves, and the pillars they are to ornament, we will suppose they are cut down to the ground, or nearly so, and have made a fresh growth, or rather are making fresh growth. Pillars for roses ought to be a foot in diameter, and are best made of trellis work or rods of iron, or, if it must be so, of wood; but they ought to be one foot through. As the leading shoots come, they ought to be wound spirally round the pillar, at such distance from each other as will enable them to fill up the space between with foliage; their leading shoots then constitute the tree, and all the side shoots bear their blooms, and form a pillar of roses. We do no mean that this is all done in a year, though some kinds go a long way towards it; here, as in all other cases of rose pruning, the little weak shoots must be removed, the strongest left on all the way up, and should be shortened to two eyes. If the tops here die down at all, shorten them to the strong top eye, not to the top eye, for several near the top may be found weak, and they would never be otherwise, whereas the stronger one will grow fast, and soon supply the place of the old top.

When the buds first show in spring, it will be right to go over the roses carefully, to remove any that are in the way; and the growth of some roses will be found so different to that of others, that one sort will want enormous room to develop its shoots and blooms, while another will make but short branches and bloom abundantly. These characteristics will be discovered in a year's growth, if not well explained beforehand, and the provision can be made accordingly. Many Pillar or Climbing Roses are made to run over arches from pillar to pillar, or along festoons from pillar to pillar; the best way to manage those parts which form the arch, or festoon, is merely to thin out their weak branches without shortening their strong ones, because they will bloom more abundantly, which is the great charm; and the loose and free manner in which they hang about will be to their advantage, so they be kept within bounds a little.

Pruning and Training Roses on Flat Trellises, Walls, and Fronts of Houses.

The management of this family is very similar to that of Pillar Roses, except that the leading shoots must be encouraged to grow the best way to fill up the space allotted to the plant, for which purpose it will be advisable, in some cases, to train the strongest two shoots horizontally right and left along the bottom; or if the space to cover be only one way, to train one strong shoot along the bottom, and turn it up at the end; if it reach further, the rest of the strong shoots may be fanned out at equidistances, and all the weak joints removed. The next year, rub off the buds that are coming where they are not wanted. Allow any strong shoots that come up from the bottom horizontal shoot, to grow as much as they will, but no weak ones. A fast-growing Rose will soon cover a house front, a trellis, or wall, and flower all over.

When the space gets filled, you must continue cutting out, from year to year, all thin, spindley shoots, and spare the strong ones, so that the stongest eyes only are developed, instead of all of them; and the Roses are closely set to their wall or trellis, instead of hanging lolloping about; the very thing which is good on a pillar, or an arbor, or over an archway, or on festoons, being the reverse on a flat surface. As a never-failing operation, however, in all cases, the weak, spindley shoots may always be removed, whether the strong wood be shortened or not.

Pruning of Standards on Their Own Bottoms, or Roots.

It is very common to see among Dwarf or Bush Roses, a strong shoot growing upright, a sucker from the root; and it is frequently the case that these will rise up to five or six feet high. In the Moss Roses, this is often to be found. These may always be trained into standard trees, with heads in every way proportioned to the stem. As soon as a vigorous shoot of this kind makes its appearance, cut in the bush at bottom rather hard, as it will tend to strengthen the root, which will be relieved of some of its work by the operation. When the shoot has attained the required height, pinch off the top; this will encourage side shoots, all of which, except the two or three at the top, must be rubbed off. It rarely occurs, however, that any side growth is made the first season; so that the better way, unless the shoot be getting too long early in the season, is to let it ripen its wood. The latter part of the autumn, you may look at the root, to see what state it is in, and how far it may be dependent on the main root. If it be closely joined, so that there would not be sufficient root if separated, the old bush must be sacrificed, and the root secured for the standard. As the upper part of the shoot may not be well ripened, it will be as well to bind a hay band round it, or tie some moss or other litter, to save it from sharp frost, though moderate ones will not injure.

In the spring, cut the end off as low down as will do for your purpose, and when the buds shoot out, it will be seen that the three or four upper ones come first; all others on the stem must be rubbed off. Nor is it any great use having two buds on the same side of the tree; if you can manage to have three, or even four, within a few inches of the top, pointing different ways, they will form the better hold of it, to strengthen the other portion of the tree. Continue to be watchful as to other buds that will be continually pushing from the main stem, and let not one grow but those you have selected for the head.

At the end of the year, these will have made considerable growth, and, instead of being cut back the next spring to two eyes, as is the case with many, cut them back only so far as to insure the strength of the remainder, say, so as to leave five or six eyes. The next season of growth, there will, out of three or four branches, come four or five branches each. Those which come in their places, to help form a handsome head, may be allowed to grow; but if any come so as to cross others, or where there is plenty of growth already, let them be rubbed off; but it is quite possible for an eye to shoot where it is not wanted, and yet the first or second eye of that shoot may be in a direction to fill up a vacancy where it is necessary; this must, of course, be looked to before buds are rubbed off. These branches, when grown another season, will stretch out the head on all sides to a respectable size, and enable you to thin out the weak wood, and cut back the strong; so that instead of having the head pimping and small, it may bear a proportion to the stem; for, as we have said before, the head ought to be as wide across as the stem is long from the ground, to the under part of the head. There is one thing to be observed with regard to standards on their own bottom: they never break off, nor decay, nor canker, half so much as budded and grafted ones.

GENERAL HINTS.

We may mention, as a general characteristic, that there is no plant which yields more willingly to culture than the Rose, nor in the growth of which there is so much certainty. If you desire a large quantity of bloom, and are not anxious about the size of the flowers, there is nothing required but to spare the knife; take out weak shoots, but leave plenty of wood on the tree; for every eye will bloom, and the more you leave on, the better for that purpose. In this case, the new wood made is but short, because there is so much of it. If, on the contrary, you desire large blooms, cut away all the strong wood, of the year previous, down to two eyes at the most, and cut all the weak wood out altogether. Indeed, you may go further; for you may cut away half the strong shoots, and lessen the number of eyes still more.

Again, roses in poor soil will grow and bloom; their flowers will be smaller, but not less healthy; their wood will be weaker and shorter, but still sound. The principal danger when a Rose is starved is, that it may come less double; and this is so serious a fault, that it has occasioned many to be thrown away that did not deserve it, and caused many others to be considered wrong varieties, when they wanted nothing but good growth to make them right ones. On the other hand, rich soils will cause a Rose to grow enormously; and all intermediate growths between the strongest and the weakest may be secured according to the soil they are put in to grow. Generally, people fancy that dung is the only thing required; this is a mistake, loam is required to grow the Rose in perfection; and if the ground is poor and light, a spadeful of loam and a spadeful of dung will be far better than two spadefuls of dung. This ought to be always mixed with the soil a little, and the Rose planted in it.

Roses are sadly injured by the wind, and the blooms require fastening to something or other, to prevent their being frayed. The stakes of roses should always be made fast to the Rose, or the roses made fast to the stakes with leaden or copper wire; because bass matting, or other perishable stuff, will give way when high wind takes them, and they receive a good deal of mischief before they are observed and fastened again.

Of the roses at present in cultivation, very few which are not semi-double will open out boldly; and those which are semi-double, are not fit to show as single flowers. There are, however, some which will bear the test of stand-showing, and they not of the dearest or newest. Those, therefore, who desire to grow none but perfect flowers, should state to the dealer, of whom they mean to buy, that their object is to have none but such as will expand and show a good face when fully bloomed, as they purpose growing none others. The establishment of the showing in stands, like dahlias, will cause many old and fine roses to be appreciated, and a great many new ones to be discarded; for although it is not the gayest mode of exhibiting roses, it is by far the best mode of testing, and it is curious to see the number of varieties with very glaring faults. For instance, some are close balls of petals, with the outer ones rolling back a little, as if they were shrivelling; but never opening fairly. Others no sooner open than they show their yellow seeds and their paucity of petals; some are on stems too weak to hold them in their position; others, again, burst into a broken mass of ill-formed petals, that do not compensate for their sweetness. Some fall to pieces the instant they are open, and others almost before they open; many are shapeless masses of colored flimsy texture, that neither hold themselves in form nor impart fragrance. It is worth while to direct the attention of the amateur to the large collections of roses sometimes to be seen at exhibitions, and to the very few which are to be found among them of a fine form. They will observe bunches of half-bloomed flowers, that dare not be shown; they will find plenty of hard lumps, on stems not strong enough to bear them without lolloping about; they will find some without a round smooth petal among them, but very few so good as the Tuscan, the Cabbage, the Moss, the Provence, and the oldest of the known good varieties. This shows the necessity of attention to the hints we have thrown out; for we must again confess, that although we have selected the best among eleven or twelve hundred roses, there are many that we shall see rejected like the remainder of the entire collection, to make way for better flowers and better taste.

As a concluding observation respecting the management of the Rose, we are bound to say, that a good deal that is done now is erroneous, although taught by rose cultivators; and especially with regard to roses in pots, which, however pretty they may look, are very much drawn, and very unnaturally supported. That the system, if pursued, will lead to the introduction and toleration of varieties which cannot support themselves, in the same manner as it did to the introduction of worthless geraniums, there is no room to doubt; for in the specimens exhibited in pots at various shows, the total inability of the flowers and stems to support themselves is manifested, as well as the dispositions to encourage this strange mode of distorting things. Some allowance should be made for any forced subject; but that gardener who can produce his plants without supports, is the one who deserves a prize for his skill; not the man who draws a plant till it cannot support itself, and then keeps it up with framework.

There is much to be done in the choice of roses, for particular objects. Those inclined to droop should be on very tall stalks, for their pendulous habit is very handsome, and renders the tree a beautiful drooping object; those for bushes ought to be short jointed and close habited, as best suited to dwarfs, and so also will they be found for dwarf standards.

The general routine for rose culture is given both as respects the general collection, and also for seedlings; and with attention to what has been here written, we think a mere novice may, with a little enterprise, beat one who grows upon any other system.

Few people are aware of the injustice sometimes done to roses, which are condemned as worthless, when the culture alone is the cause of their misbehavior. The Rose is a fidgety customer. The French people are famous for raising new varieties, and describing them as very superb; the English and American nurserymen buy them as soon as they can be obtained, and describe them to their customers as something *recherché;* they are purchased by amateur cultivators upon the strength of such characters, grown for a year, and too often thrown away as worthless. Once for all, let us inform our readers, that no Rose can be depended on for growing to its character under the third season. The effect of poor culture is to make a Double Rose semi-double and single; and that which would be rich culture to anything else, may be poor to the Rose, because if it be not suitable, it may as well be poor.

There are many things which affect the Rose, but the principal one is tantamount to saying that it does not feel itself at home. European nurserymen often propagate roses rather too mechanically; the greater part of them are "made to sell." So long as the stock will keep the bud alive, and let it grow, that is all the nurseryman asks or wishes. Now, it is quite certain that a stock without much root will live, and hundreds of plants sent from abroad are of this description. There may be strength enough in the stock to grow and bloom the kind upon it, but as the stock is not fairly at home, the first year is often wasted in making root enough to lay hold of the ground, and during this period, the head is grown but poorly.

As to blooming, it should not be allowed until the growth is vigorous, for it comes miserably poor, if at all. The second year, it is more reconciled to its place, and the third may be considered a fair trial. Take the very best Rose we have, and grow it badly, the result will be bad flowers; but, if this be the case with well-known varieties, how cautious ought we to be of condemning a candidate for our favors when we have no evidence of its real character. Rose growers say it is impossible to tell, after a removal, what a Rose ought to be by what it is; that it ought to be tried three seasons before condemnation, and not be discarded under an idea that it is useless, merely because it flowers badly, which is not always the case. A Rose will sometimes be for several years only middling, when, if it liked the ground, it would be excellent.

When you have a Rose, first you should cut away all bruised parts of the root, and see that all the broken ends of the shoots in the ground, or root shoots, are smooth; then plant it the first year in good strong fresh loam, from a pasture. If rotten dung be at the bottom, so much the better, but do not let the dung touch the roots. Cut nothing back of the head or bud shoot, or if it be an established head, cut nothing back until you see the buds swelling, so as to enable you to calculate what portion is alive, and what has died back. As soon as this is indicated by the growing of the buds, cut away clean to the tree all the branches which may have perished. When these are removed, you see what head you have to depend on, and how much you may cut back without losing an opportunity of forming or improving a head for the next season. For instance, all the branches but one will often die back, and be forced to be removed by the knife. Had the pruning at first been close, and each branch cut back to two eyes, there would be but two, of course, left on the only living one, and but two shoots could be had from them; having, however, discovered that but one branch is left, this has to be preserved somewhat longer, and therefore should be pruned to four or five, instead of two eyes. These may be managed to form branches all round the tree, or rather at such distance as prudence dictates, due regard being had to the strength of the plant. If the tree takes off vigorously, and the wood grows very strong, the bloom is pretty sure to be inferior, as indeed is the case when almost any plant runs to wood; so that it is quite as unlikely that the bloom of the Rose is in character when the plant is too vigorous, as when it is meagre or too much starved

Hybridising has done much good for roses, but it has also done its mischief; for, if it has introduced some splendid varieties, it has teased us with hundreds not worth growing; some, which are close hard lumps of rolled-up petals, turn over their thin edges like a dog-eared book; the backs of the petals a dull color, scarcely any scent to them, and altogether bad openers, and bad if they can be made to open. There is no reason why the Rose should not be as perfect as the Camellia japonica. There are some of the Bourbons with petals as smooth and as thick, and almost as regular; and these are the kinds to buy and grow. They hold their form longer and better than those with thin petals; they open more freely, and are better when they do open. The habits of these full-flowered plants are better; the flowers, instead of lolloping their heads down, show themselves well. All the full free opening roses of old age are of this description; witness the Cabbage Rose, the Maiden's Blush, the Provence, and some others, which are as familiar as the name of the Rose itself. It is true that the bud of a Rose is pretty, and that a bunch of roses is pretty, but while we have good roses that will open, and of almost every color, it is unnecessary to grow bad ones; and if the character of roses is established by showing single blooms, which shall be required to be open, there will be but little difficulty in doing all the rest.

Nevertheless, on receiving roses from nurseries, whether American or foreign, pay attention to these directions in the planting, and be not in a hurry to condemn. Let them fail the first season, and be even middling only the second, but give them the benefit of the doubt, and try them a third season. Convince yourself that the variety is incapable of becoming better, and that you have seen their natural habit, before you throw them away. If a petal is thin and curly, rough-edged and flimsy, it can never be good; if the petals are good, but there are too few of them, there is great hope that culture will improve it from a semi-double to a perfect double, which is all that is wanted.

CALENDAR OF OPERATIONS.

The following Calendar for the management of the Rose, during each month of the year, is designed for the central parts of the United States, including the temperate regions of Maryland, Virginia, Ohio, Kentucky, Indiana, Missouri, and Illinois. The season of spring commences in the middle latitudes of Georgia, Alabama, Mississippi, and of Texas, and the northern part of Louisiana, and the southern part of Arkansas, about one month earlier; and a month or five weeks later in Rhode Island, Massachusetts, and in the central latitudes of New York, Wisconsin, and of Michigan. The period of sowing, however, will admit of some latitude, on account of the degree of dryness of the soil, and of its exposure to cold or moist winds, and to the solar warmth.

It has long been observed that Nature, in her operations, is so uniform, that the forwardness of trees, in unfolding their flowers and leaves, is an unerring indication of the forwardness of spring; and that the period at which the shrub red bud (*Cercis canadensis*) puts forth, is the proper time to plant Indian corn, and sow in open culture the seeds of the Rose.

January.

Look well to all standard roses; see that their stakes are firmly in the ground, and the stocks or trunks are well fastened to them. If the heads of standards are very large, compared with the hold they have upon the stock, it is necessary that the stock to which the tree is fastened should reach partly through the head, and be fastened to the head itself. It is also desirable, when very large growth has been made, to shorten, though not properly prune, all the longest branches, to lessen the head, that the wind may not have too much power. If you have not provided yourself with stocks before this month, lose no time, and when procured, prune the roots into moderate form, for they will frequently be found straggling and awkward. Besides planting out a number in rows, to be worked in the open ground, pot some of the most compact-rooted in pots, and plunge them, making a post-and-rail sort of frame along them to fasten the stocks to, and prevent them from being disturbed by the wind; also, if you have not got in all the roses you want, order them and plant.

Protect the smooth-wooded kinds, budded on the stocks, in pots, from the cold, and see that those in beds are well covered with litter where there is danger of their suffering from frost; and, as the smooth-wooded varieties budded in pots will be growing, support their shoots and remove all other eyes from the stocks the instant they break.

At the *North*, where roses in parlors and greenhouses are coming into flower, syringe the plants freely with water, and occasionally with a solution of Peruvian guano, mixed in the proportion of half a pint of guano to eight gallons of water. Fumigate often with tobacco, in order to keep down the green fly; and with sulphur, to kill the red spider.

February.

Look over the established stocks, and see which are most favorable for grafting; and if you have any wood of roses you intend to graft, leave it on the trees; but if you have to obtain wood, seek for it in time; and if you get it, plant the thickest end downward in the ground, in some shady place, because they ought not to be grafted till next month, and the cuttings will keep some time. The China Roses in the house, and roses in the forcing house, must be kept well syringed, and watched carefully, that, in the event of the green fly attacking them, they may be fumigated, as well as syringed. Roses in pots should be kept a little moist, and if not pruned in autumn, should be pruned directly. Look to a supply of wild stocks, if you have not yet completed your arrangements.

Bruise the berries which have been saved for seed, and rub out the seed ready for sowing next month.

At the *North*, continue the same treatment as recommended last month

March.

Prune all roses which were left half done in the autumn, or not done at all, especially grafted and budded ones of last year, as they have this year to make some growth. Stocks may still do if the season is backward but not a day must be lost. Look over all the standard trees, examine the pushing buds, trim out all weak shoots from the buds, and cut away all shoots from the stock. This must be always considered of first consequence, for the growth of a branch from a stock will completely check the growth of the head. All grafted and budded trees, when once fairly growing, should be deprived of all means of growth from the stock itself. It is not wise to destroy altogether the growth of the stock above the graft or bud, until the union and subsequent growth of the graft or bud itself are well established; but this once accomplished, leave no vestige of growth belonging to the stock, and constantly rub off every bud. You may commence grafting this month.

Sow the seeds in large pots or deep pans, and keep them from once getting dry, or being frosted.

At the *North*, hardy roses may be safely pruned the last of this month.

April.

If any suckers appear among established roses or stocks, worked or unworked, remove the earth down to where they join the root, and cut them off close. If the rose quarter is at all infested with snails or slugs, use all means to destroy them. Inverted flower pots, tilted on one side, will catch many snails; cabbage leaves laid on the ground, and examined daily, will entrap slugs. All stocks on which grafts or buds failed last season must be looked upon as new stocks, and cut down to where they appear alive. The shoots upon which buds were placed should be cut off close, as well as side growths, if they are intended for budding, but if for grafting, the inside shoots may be strong enough to graft on; if the grafts, and the shoot grafted on, be nearly alike, the graft may be all the safer, and the place of union more completely healed than when small grafts are placed in large stocks. This month is a good one for grafting or spring budding, though the operation may be performed successfully in March. Cut back to two eyes all that have been left unpruned, by which late pruning back, the blooming will be protracted considerably.

Keep the seeds sown last month, moist; and if the season be dry, moisten them by laying on the surface some wet moss. Shade them, also, from the hot sun.

At the *North*, hardy roses of all kinds should now be pruned, Moss

Roses cut back short. Rose seeds may be sown the last of this month or early in May. Spring budding may also be performed.

May.

This is an important month with the Rose. First and foremost, the vigilance in looking for the breaking buds of stocks, which would rob the head of its growth, must be doubled, and every three or four days they must be examined and rubbed off. Suckers must also be grubbed up the instant they appear. The shoots of the buds of last year will make rapid growth, and require to be screened, that the wind may not break them out or damage them; and it is a very good plan to tie a stick to the stem, to reach a foot above it, and this does well to support any of the shoots. But when a bud throws up a very strong shoot, it is well to take the top off as soon as there are two pair of leaves, for it will make the shoot form a head the first season; but, in any case, the shoots must be supported by a loose tie to the stick above mentioned.

The young seedlings will be up this month, and will require great care to keep them from damaging by too much wet, or burning up for want of moisture.

At the *North*, Tea, Bengal, Noisette and other roses may now be planted out in borders. Rose seed may be sown early in this month, and spring budding performed.

June.

This month, great diligence must be used to prevent the stocks from growing from their own wood, instead of throwing all their stength into the grafts and buds. It is time also to be looking out for sorts you intend to bud with, either by buying the plants outright, or bespeaking buds for the season; and if any come in your way about the end of the month, do not be afraid of budding on the strongest wood you can find of the present season's growth among the stocks, though you may properly choose a later season, if you have nothing to hurry you.

The young seedlings will have advanced enough to pot off, one in a pot, with loam, peat, and decomposed dung; they must be placed in the shade out of doors, or in a frame and light, in order to grow five or six weeks. See that they are watered as often as may be necessary; and on any appearance of the green fly, fumigate them with tobacco.

At the *North*, roses should be planted out in borders for summer blooming.

July.

If this month be at all forward, you may bud; and if you have wood given to you when you are not ready for it, put the ends in wet sand, and a hand glass over them; but the sooner you can use the buds after you have got them the better. The stocks must be put in completely all over, except one or two eyes beyond the bud on the branches in which the bud is inserted. All China Roses in pots or out of doors may be budded, and so also may all the smooth-barked kinds.

Plant out the young seedlings potted last month, in beds four feet wide, in the same soil, without disturbing the balls of earth; let them be six inches from the side of the bed, and a foot apart each way. Protect them from vermin by all ordinary means; shade them from the heat of the sun at mid-day; water if required.

At the *North*, roses of all kinds planted in open ground, may be layered the last of this month. Perpetual Roses will bloom best in autumn, if they are pruned in after having opened their first flowers.

August.

Continue the budding, and use every precaution to prevent the stock from growing, and remove suckers the instant they appear above ground. Nothing should be allowed to grow, except, just beyond the bud; a shoot may be beneficial, as it draws the sap past the bud; but as soon as it is united and doing well, anything growing beyond it may be broken off, or bent down to check it a little. Cuttings of the smooth-barked kinds will strike almost every month in the year; but at the end of this month, whatever you may be anxious to propagate may be struck in the shade, under a hand glass, or even quicker where there is a little bottom heat.

The same directions will also apply to the *North*.

September.

You may now examine the budded plants, and undo the ties of any that appear to swell, tying them more loosely, although tight enough to hold in the bud. If any of the buds have failed, you may open a fresh place, and insert others; but if well done, this will seldom be the case. Continue to remove any shoots or eyes that are showing growth in the stock, for on this much depends. Cuttings from the smooth-wooded kinds may be taken and struck, and any that are struck may be potted off in small pots. Weed the young plants in the beds. Water them if the season be dry.

At the *North*, roses intended for early forcing, should now be repotted and pruned.

October.

Towards the end of the month, look out for healthy stocks, or get some one in that way of business to collect for you. Always choose, and make any one who undertakes to supply you understand that you require strong stems, perfectly straight, with compact roots, that have not been much damaged by removal. Any that you get should be at once trimmed and planted in rows, about eighteen inches apart, and the rows wide enough to enable you to go up and down them well, to operate in the way of grafting and budding when required. Many of the budded stocks may now be untied altogether, but it is not well to cut the branches in which they are budded close down to the bud until the spring months. As they would be more susceptible of damage by frost, let them all be properly sheltered, and fastened, if they have become loosened. Shorten the longest branches of standard roses, that they may not hold the wind so much; and although it would be improper to prune, their close back branches may be cut clean away, because they are of no use on the tree. Cuttings of the China and smooth-wooded kinds may be taken now for general propagation. The plants will be the better for losing the wood, especially all the dwarfs in pots.

Examine the August-budded plants, and loosen the ties, if necessary. Break or cut off the wild part of the stock above the bud, all except one growing eye, to keep up the circulation; remove all other branches and shoots. Gather the "hips," or berries, of any desirable varieties for seed, as soon as ripe. Look to those roses budded on stocks in pots.

At the *North*, all tender kinds, growing in open ground, should be taken up and potted, and hardy roses may be successfully transplanted the last of this month.

November.

This is the best month in the year, if the weather is dry and open, for planting out the garden sorts of rose trees and bushes; therefore, all removals should be performed as soon as convenient, according to the plan pointed out in the foregoing treatise. The leaves of all the garden sorts are falling, or have fallen. Some of the perpetuals, and the China and hybrid kinds, are, in mild autumns, still growing, and perhaps blooming. Such must not be touched till the leaves have turned yellow, or have dropped; but in all other cases, where the leaves have faded, the removal is kindly and beneficially done. Stocks may be procured and planted, and if the permanent planting cannot, for any particular reasons, be done now, they must be temporarily planted or laid in the earth, in a sloping direction, and the roots well covered with mould, which must also be well shook in among the roots and fibres. Cuttings may still be made of the smooth-wooded kinds, and placed close together in pots of mould, with half an inch thickness of sand at the top. These pots must not be allowed to dry, but may be put in a pit or greenhouse, or plunged under a hand glass in the border, which will answer for covering them well from frost.

In all situations subject to frosts, throw light litter, as pea vines, pine boughs, or straw, over the beds containing tender varieties, at night; and if there happen to be frost, do not remove the litter during the day. Continue to gather ripe berries, or hips, as directed last month. Cut out the weak shoots from the seedlings, leaving only the robust and strong ones on the plant, except such as are intended for buds in the spring.

At the *North*, tender roses should all be taken up this month. Perpetuals and Bourbons, in the open ground, if in a well-drained situation, with a little covering, will stand the winter without injury.

December.

Planting goes on well this month, if the weather be dry and open; but if wet, and the ground does not work well, it is better deferred; for if planting is done when the soil will not crumble well, and go between the roots, they cannot succeed. Look well to last month's directions, and attend to them in all respects, if not done before.

Seed berries, designed for sowing next spring, may be preserved by putting a tile at the bottom of a flower pot, into which may be put those hips that are perfectly ripe, covering them three or four inches with sand, and let them remain until wanted; or lay them on a shelf to dry out the moisture. See, also, that the stocks, which have been budded, are secured to stakes against the effects of the wind. Protect the smooth-wooded kinds, budded on the stocks in pots, from the frost, and look well to the litter on those in beds.

At the *North*, those roses, taken up and potted last month, should now be headed in, cutting away all small shoots to one good eye. They may be wintered in a cold frame, or taken into the house, where they will bloom from February to May.

INSECTS.

The insects which infest the Rose are quite numerous; but as their habits are comparatively but little known, it has thus far been very difficult to arrest their ravages, or sensibly diminish their number, by artificial means. At least forty distinct species are described by European naturalists, but many of them do not exist among us. The only reliable authority on this subject, in this country, is Dr. T. W. Harris, of Harvard University. From his "Report on the Insects Injurious to Vegetation in Massachusetts," we copy the following, which, doubtless, will be acceptable to all who are not in possession of his work:—

The saw fly of the Rose, which, as it does not seem to have been described before, may be called *Selandria rosæ*, from its favorite plant, so nearly resembles the slug-worm saw fly as not to be distinguished therefrom except by a practised observer. It is also very much like *Selandria barda*, *vitis* and *pygmœa*, but has not the red thorax of these three closely-allied species. It is of a deep and shining black color. The first two pairs of legs are brownish grey or dirty white, except the thighs, which are almost entirely black. The hind legs are black, with whitish knees. The wings are smoky and transparent, with dark-brown veins, and a brown spot near the middle of the edge of the first pair. The body of the male is a little more than three twentieths of an inch long, that of the female one fifth of an inch or more, and the wings expand nearly or quite two fifths of an inch. These saw flies come out of the ground, at various times, between the twentieth of May and the middle of June, during which period they pair and lay their eggs. The females do not fly much, and may be seen, during most of the day, resting on the leaves; and, when touched, they draw up their legs, and fall to the ground. The males are more active, fly from one rose bush to another, and hover around their sluggish partners. The latter, when about to lay their eggs, turn a little on one side, unsheath their saws, and thrust them obliquely into the skin of the leaf, depositing in each incision thus made a single egg. The young begin to hatch in ten days or a fortnight after the eggs are laid. They may sometimes be found on the leaves as early as the first of June, but do not usually appear in considerable numbers till the twentieth of the same month.

How long they are in coming to maturity, I have not particularly observed; but the period of their existence in the caterpillar state probably does not exceed three weeks. They somewhat resemble the young of the saw fly in form, but are not quite so convex. They have a small, round, yellowish head, with a black dot on each side of it, and are provided with twenty-two short legs. The body is green above, paler at the sides, and yellowish beneath; and it is soft, and almost transparent like jelly. The skin of the back is transversely wrinkled, and covered with minute elevated points; and there are two small, triple-pointed warts on the edge of the first ring, immediately behind the head. These gelatinous and sluggish creatures eat the upper surface of the leaf in large irregular patches, leaving the veins and the skin beneath untouched: and they are sometimes so thick that not a leaf on the bushes is spared by them, and the whole foliage looks as if it had been scorched by fire, and drops off soon afterward. They cast their skins several times, leaving them extended and fastened on the leaves; after the last moulting, they lose their semi-transparent and greenish color, and acquire an opaque yellowish hue. They then leave the rose bushes, some of them slowly creeping down the stem, and others rolling up and dropping off, especially when the bushes are shaken by the wind. Having reached the ground, they burrow to the depth of an inch or more in the earth, where each one makes for itself a small oval cell, of grains of earth, cemented with a little gummy silk. Having finished their transformations, and turned to flies, within their cells, they come out of the ground early in August, and lay their eggs for a second brood of young. These, in turn, perform their appointed work of destruction in the autumn; they then go into the ground, make their earthen cells, remain therein throughout the winter, and appear in the winged form, in the following spring and summer.

During several years past, these pernicious vermin have infested the rose bushes in the vicinity of Boston, and have proved so injurious to them, as to have excited the attention of the Massachusetts Horticultural Society, by whom a premium of one hundred dollars, for the most successful mode of destroying these insects, was offered in the summer of 1840. About ten years ago, I observed them in gardens, in Cambridge, and then made myself acquainted with their transformations. At that time, they had not reached Milton, my former place of residence, and have appeared in that place only within two or three years. They now seem to be gradually extending in all directions, and an effectual method for preserving our roses from their attacks has become very desirable to all persons who set any value on this beautiful ornament of our gardens and shrubberies. Showering or syringing the bushes with a liquor, made by mixing with water the juice expressed from tobacco by tobacconists, has been recommended; but some caution is necessary in making this mixture of a proper strength, for if too strong, it is injurious to plants; and the experiment does not seem, as yet, to have been conducted with sufficient care to insure safety and success.

Dusting lime over the plants, when wet with dew, has been tried and found of some use; but this and all other remedies will probably yield in efficacy to Mr. Haggerston's mixture of whale-oil soap and water, in the proportion of two pounds of the soap to fifteen gallons of water. Particular directions, drawn up by Mr. Haggerston himself, for the preparation and use of this simple and cheap application, may be found in the "Boston Courier," for the twenty-fifth of June, 1841, and also in most of our agricultural and horticultural journals of the same time. The utility of this mixture has already been repeatedly mentioned in my treatise, and it may be applied in other cases with advantage. Mr. Haggerston finds that it effectually destroys many kinds of insects; and he particularly mentions plant lice of various kinds, red spiders, canker worms, and a little jumping insect which has lately been found quite as hurtful to rose bushes as the slugs or young of the saw fly. The little insect alluded to has been mistaken for a species of thrips, or vine fretter; it is, however, a leaf hopper, or species of *Tettigonia*, much smaller than the leaf hopper of the grape vine, (*Tettigonia vitis*,) and, like the leaf hopper of the bean, entirely of a pale-green color.

In treating of the common Rose Bug, or Rose Chafer, (*Melolontha subspinosa*,) Dr. Harris says:—

The natural history of the rose chafer, one of the greatest scourges with which our gardens and nurseries have been afflicted, was for a long time involved in mystery, but is at last fully cleared up. The prevalence of this insect on the Rose, and its annual appearance coinciding with the blossoming of that flower, have gained for it the popular name by which it is here known. For some time after they were first noticed, rose bugs appeared to be confined to their favorite, the blossoms of the rose; but within thirty years, they have prodigiously increased in number, have attacked at random various kinds of plants in swarms, and have become notorious for their extensive and deplorable ravages. The grape vine in particular, the cherry, plum and apple trees, have annually suffered by their depredations; many other fruit trees and shrubs, garden vegetables and corn, and even the trees of the forest and the grass of the fields, have been laid under contribution by these indiscriminate feeders, by which leaves, flowers, and fruits are alike consumed.

The unexpected arrival of these insects in swarms, at their first coming, and their sudden disappearance, at the close of their career, are remarkable facts in their history. They come forth from the ground during the second week in June, or about the time of the blossoming of the Damask Rose, and remain from thirty to forty days. At the end of this period, the males become exhausted, fall to the ground, and perish, while the females enter the earth, lay their eggs, return to the surface, and, after lingering a few days, die also. The eggs laid by each female are about thirty in number, and are deposited from one to four inches beneath the surface of the soil; they are nearly globular, whitish, and about one thirtieth of an inch in diameter, and are hatched twenty days after they are laid. The young larvæ begin to feed on such tender roots as are within their reach. Like other grubs of the Scarabæians, when not eating, they lie upon the side, with the body curved so that the head and tail are nearly in contact; they move with difficulty on a level surface, and are continually falling over on one side or the other. They attain their full size in autumn, being then nearly three quarters of an inch long, and about an eighth of an inch in diameter. They are of a yellowish-white color, with a tinge of blue towards the hinder extremity, which is thick and obtuse or rounded; a few short hairs are scattered on the surface of the body; there are six short legs, namely, a pair to each of the first three rings behind the head; and the latter is covered with a horny shell of a pale rust color. In October, they descend below the reach of frost, and pass the winter in a torpid state. In the spring, they approach toward the surface, and each one forms for itself a little cell of an oval shape, by turning round a great many times, so as to compress the earth and render the inside of the cavity hard and smooth. Within this cell, the grub is transformed to a pupa, during the month of May, by casting off its skin, which is pushed downward in folds from the head to the tail. The pupa has somewhat the form of the perfected beetle; but it is of a yellowish-white color, and its short stump-like wings, its antennæ, and legs are folded upon the breast, and its whole body is inclosed in a thin film, that wraps each part separately. During the month of June, this filmy skin is rent, the included beetle withdraws from its body and its limbs, bursts open its earthen cell, and digs its way to the surface of the ground. Thus the various changes, from the egg to the full development of the perfected beetle, are completed within the space of one year.

Such being the metamorphoses and habits of these insects, it is evident that we cannot attack them in the egg, the grub, nor the pupa state; the enemy, in these stages, is beyond our reach, and is subject to the control only of the natural but unknown means appointed by the Author of Nature to keep the insect tribes in check. When they have issued from their subterranean retreats, and have congregated upon our vines, trees, and other vegetable productions, in the complete enjoyment of their propensities, we must unite our efforts to seize and crush the invaders. They must indeed be crushed, scalded, or burned, to deprive them of life; for they are not affected by any of the applications usually found destructive to other insects. Experience has proved the utility of gathering them by hand, or of shaking them or brushing them from the plants into tin vessels containing a little water. They should be collected daily during the period of their visitation, and should be committed to the flames, or killed by scalding water. The late John Lowell, Esq., states, that in 1823, he discovered on a solitary apple tree, the rose bugs "in vast numbers, such as could not be described, and would not be believed if they were described, or at least none but an ocular witness could conceive of their numbers. Destruction by hand was out of the question" in this case. He put sheets under the tree, and shook them down, and burned them. Dr. Green, of Mansfield, whose investigations have thrown much light on the history of this insect, proposes protecting plants with millinet, and says that in this way only did he succeed in securing his grape vines from depredation. His remarks also show the utility of gathering them. "Eighty-six of these spoilers," says he, "were known to infest a single rose bud, and were crushed with one grasp of the hand." Suppose, as was probably the case, that one half of them were females; by this destruction, eight hundred eggs, at least, were prevented from becoming matured.

During the time of their prevalence, rose bugs are sometimes found in immense numbers on the flowers of the common white weed, or ox-eye daisy, (*Chrysanthemum leucanthemum,*) a worthless plant, which has come to us from Europe, and has been suffered to overrun our pastures, and encroach on our mowing lands. In certain cases, it may become expedient rapidly to mow down the infested white weed in dry pastures, and consume it with the sluggish rose bugs on the spot.

Our insect-eating birds undoubtedly devour many of these insects, and deserve to be cherished and protected for their services. Rose bugs are also eaten greedily by domesticated fowls; and when they become exhausted and fall to the ground, or when they are about to lay their eggs, they are destroyed by moles, insects, and other animals, which lie in wait to seize them. Dr. Green informs us that a species of dragon fly, or devil's needle, devours them. He also says that an insect which he calls the enemy of the cut worm, probably the larva of a Carabus, or predaceous ground beetle, preys on the grubs of the common dor bug. In France, the golden ground beetle, (*Carabus auratus*,) devours the female dor or chafer at the moment when she is about to deposit her eggs. I have taken one specimen of this fine ground beetle in Massachusetts, and we have several other kinds, equally predaceous, which probably contribute to check the increase of our native Melolonthians.

THE DAHLIA.

INTRODUCTION.

Though severed from its native clime,
  Where skies are ever bright and clear,
And nature's face is all sublime,
  And beauty clothes the fragrant air,
  The Dahlia will each glory wear,
With tints as bright, and leaves as green,
As on its open plains are seen.
  And when the harvest fields are bare,
She in the sun's autumnal ray,
With blossoms decks the brow of day.
MARTIN.

ABOUT ten years before the close of the last century, this favorite flower was sent from Mexico to Spain, and a few specimens were procured, in the year of its importation to that country, from Madrid, by the then Lady Bute, but through some mismanagement the species was lost, until Lady Holland obtained seed from the same city in 1804; while in 1802, another species, (*Dahlia coccinea*,) had been brought from Mexico through France; neither the latter nor the former, (*Dahlia frustranea*,) seems, however, to have attracted much attention amongst the floricultural world; and it was not until after the peace of 1815, that it became an object of professional care. when a supply was obtained in England, from France, where its cultivation had already been carried to some extent; since which period, an indefinite number of varieties has been procured by the persevering ingenuity of the florist, and a monomania for this flower existed for many years unsurpassed in inveteracy, save by the extraordinary "Tulipomania" of the seventeenth century. This has in some degree subsided, and the Dahlia is taking its proper rank as a deservedly esteemed flower, blooming at a season of the year when the number of flowering plants in the open garden is very limited.

The name of Dahlia was given to it in honor of Dahl, a Swedish botanist and a pupil of Linnæus; there was an attempt to change it to Georgina, and on the continent this has prevailed to a considerable extent; but in England and this country, it has been entirely rejected.

REQUISITES OF A PERFECT FLOWER.

The following characteristics are agreed upon by the London Floricultural Society as necessary to the perfection of the Dahlia:—

1st. The general form should be that of about two thirds of a sphere, or globe. The rows of petals forming this globe should describe unbroken circles, lying over each other with evenness and regularity, and gradually diminishing until they approach the top. The petals comprising each succeeding row should be spirally arranged and alternate, like the scales of the fir cone, thereby concealing the joints and making the circle more complete.

2d. The petals should be broad at the ends, perfectly free from notch or indention of any kind, firm in substance, and smooth in texture. They should be bold and free, and gently cup, but never curl or quill, nor show the under sides; they should be of uniform size, and evenly expanded in each row, being largest in the outer rows, aud gradually and proportionately diminishing until they approach the summit, when they should gently turn the reverse way, pointing towards and forming a neat and close centre.

3d. The color in itself should be dense and clear; if in an edged flower, concentrated and well defined; and in both cases penetrating through the petal with an appearance of substance and solidity.

4th. Size must be comparative.

PROPAGATION.

The Dahlia may be propagated from tubers, by slips or cuttings, or from seed.

Propagation from Seed.

This method is now seldom practised, except by those who desire to obtain new varieties by hybridising between two distinct species or choice varieties. The proper time for sowing the seed is in March or April, in light soil in shallow boxes or pans, which are placed in a moderate hot bed to promote their germination; though some florists think that plants as vigorous, if not more so, may be obtained from seed sown in a warm and well-sheltered border toward the end of April, or in the early part of May, provided the young plants are protected during the night and guarded from casual frosts; or the seed may be sown in pans in March in the house, and put out in the open air on mild days, to accustom them to the external atmosphere. In any treatment, when the seed leaves are fully developed, they must be allowed plenty of fresh air, or placed in a cold frame, taking care that they are put as near as possible to the glass, to prevent their being drawn and growing lanky; they may also be potted singly, or three or four together, as soon as they will bear handling. When they have four leaves, they may be treated in every respect as old plants, and from the twentieth of May to the middle of June, they may be planted where it is intended they should flower.

Seed Gathering.—The seed should be collected in September from dwarf plants, where no preference exists on other accounts; and, when double varieties are principally sought for, from semi-double flowers. Seeds procured from those florets, which have changed their form, are supposed to have a greater tendency than the other to produce plants with double flowers.

Propagation by Tubers, or Slips, and by Grafting.

This is the mode most commonly adopted for the propagation of this favorite plant, and the operation is begun in March or April, by removing the tubers from the place where they have been deposited during the winter, and putting them in pots, or in loose earth on a mild hot bed. The crown of each tuber is left uncovered to permit each shoot to develop itself, under the full influence of the atmospheric air. When the shoots have attained the length of about three inches, they are cautiously separated from the tuber by laying hold of the slip with the thumb and finger near its base, and gently moving it backward and forward until it comes out of its socket. Mr. Paxton recommends that where the shoots are numerous, a part of the crown of the tuber should be invariably taken off with the shoot, a course more likely to be attended with success than by extracting the slip.

The following mode of increasing choice varieties of this favorite flower was discovered by Mr. Blake, of Kensington Gore, and is now commonly practised :—

Select a good tuber of a single sort, taking special care that it has no eyes; then, with a sharp knife, (for a dull edge would mangle the fleshy root, make it jagged, and so prevent a complete adhesion of the scion and stock,) cut off a slice from the upper part of the root, making at the bottom of the part so cut a ledge wherein to rest the graft. This is done because you cannot tongue the graft as you would do a wood shoot; and the ledge is useful in keeping the cutting fixed in its place while you tie it. Next cut the scion, (which should be strong, short jointed, having on it two or more joints or buds,) sloping to fit, and cut it so that a joint may be at the bottom of it to rest on the aforesaid ledge; a union may be effected without the ledge, provided the graft can be well fixed to the tuber, but the work will not then be so neat. It is of advantage, though not absolutely necessary, that a joint should be at the end of the scion; for the scion will occasionally put forth new roots from the lower joint; the stem is formed from the upper joint; therefore procure the cuttings with the lower joints as near together as possible.

After the graft has been tied, a piece of fine clay, such as is used for common grafting, must be placed round it; then pot the root in fine mould in a pot of such a size as will bury the graft half way in the mould; place the pot in a little heat in the front of a cucumber or melon frame, if you chance to have one in work at the time; the front is to be preferred, for the greater convenience of shading and watering which are required. A striking glass may be put over the graft, or not, at pleasure. In about three weeks, the root should be shifted into a large pot, if it be too soon to plant it in the border, which will probably be the case, as the plant cannot go out before April or May, so that the shifting will be very essential to promote its growth till the proper season of planting out shall arrive.

Treatment of Slips.—The shoots having been carefully separated from their parent tuber, they are immediately placed in thumb pots, filled with light soil, not inserting each more than an inch deep; when this is done, the pots are plunged in the hot bed. When they have filled these small pots with roots, they are shifted into others, which may serve them until the time for planting, unless that be protracted by unfavorable weather; in which contingency it will be desirable to remove them again into a size larger, to allow the roots to grow more freely, and to prevent their becoming a close and compact mass, which would be highly detrimental to their vigorous development, and the future health of the plant, when consigned to the open ground. Numerous shoots are emitted from the same tuber in succession, and these are treated in precisely the same manner when arrived at the proper length. They must be shaded from the sun while making roots, and protected from vapor and frost. The best compost for the Dahlia in pots is a mixture of sifted decayed hotbed dung, light virgin loam, and pure white sand, in equal quantities.

Situation and Preparation of the Soil.

The natural habitat of the Dahlia is, we are informed, in a rather light soil and on open plains. English cultivators recommend a sheltered situation; that is, sheltered from high winds, which break and shatter their lateral branches, however much they may be strengthened and supported by stakes; yet fully exposed to the sun, and where they can have the advantage of a free circulation of air, the soil naturally damp, rich, of good depth, and on a dry bottom. The soil, however, is rarely so good that it cannot be improved for the purpose for which it is desired, and it is recommended that those who would grow the Dahlia to perfection should trench the ground in November, previous to its being required, by first removing the soil to the depth of twelve inches, and replacing it with equal portions of good yellow loam and peat earth; and then trenching it again to the depth of two feet, mixing the original sub-soil and the loam and peat thoroughly together, with a large quantity of stable manure, thoroughly decayed, or it will be injurious. This may seem an expensive process, but once done it will need no further preparation for many years, except the occasional addition of manure.

N. B.—In a strong clay soil, enriched with well-decayed manure, the Dahlia produces the largest *flowers;* in a light soil, the *plant* grows to a great size, but the flowers are comparatively small.

TREATMENT.

Those who have no hot bed wherein to start their Dahlias into a growing state, may do so with equal success, and may obtain even more vigorous and better-blooming plants than those which are excited by artificial heat, by planting them in March or April in a box of light soil or decayed leaves, keeping it in a moist state, and exposing them to the full heat of the sun throughout the day, and taking them in-doors at night. When the shoots are three or four inches long, they may all, except one, be taken off close to the tuber, and treated as slips; but if you can divide the tuber into as many pieces as there are shoots, it is to be preferred.

Planting Out.

There are few situations, in the Middle and Northern States, where Dahlia plants can be planted out with safety before April, May, or the early part of June. When the operation is performed, the plants, if on beds by themselves, which is desirable, should be set in rows not less than six feet apart each way. Due regard must be had to the respective heights of the plants and the colors of their flowers; if on a bed where they are to be viewed from all sides, the tallest-growing kinds should be placed in the centre; if to be seen only from the front, the loftiest must be set at the back; and, in reference to colors, so arranged that they will produce a harmonious effect as a mass. Your plants, if well grown, will be from eighteen inches to twenty-four in height, when planted, and should be supported by stakes immediately; when they are full two feet high, the top of the leading shoots, or upright stem, should be cut off to induce the plant to throw out laterals.

It is a very common error to keep the Dahlia in pots too small for the quantity of roots the plant has formed, and the evil consequences of this are increased in seasons when it is most desirable they should be avoided; for if the weather be so unfavorable as to put off the period of planting out, the roots have been meanwhile increasing, and filling up the pot, so that when the plant is taken out to be set in the open ground, the ball of earth cannot be removed without breaking some of the fibres; and, fearful of doing this, many persons plant them without disturbing it, and the result generally is, that the plant does not begin to grow vigorously until near the time when it ought to be in flower. It is better, indeed, to break some of the fibres, and get away the dried and baked earth from around the roots; for though it seems to give a violent check to the growth of the plant, it will, when it has recovered, thrive far better than those planted with the ball entire; it is, however, preferable to avoid the necessity for the latter plan, or the alternative of breaking the roots, by planting them in pots of a larger size than those commonly used. The crown of the tuber should be placed at least three inches below the surface of the soil in planting out.

Mulching and Watering.

When the plants are two feet high, remove the earth from around the base of the stems to the depth of three or four inches; supplying its place with well-decomposed manure, which must be slightly covered with earth; in dry weather, the plants must be watered through this mulching twice a week at least, or every other day, according to the state of the weather; and this should be done in the evening. The

Dahlia is greatly benefited by this system of mulching and watering; for, unlike many other kinds of plants, it seeks its nourishment chiefly from the surface of the soil; and its roots will be found, in favorable circumstances, to be clustered together near it. Throughout the summer it is also advantageous to the plants to have the earth around the roots carefully loosened by the use of a fork, from time to time

AFTER CULTURE.

Dahlias should never be pruned until the bloom buds show, and then but few branches should be cut out, and only such as are growing across others. The buds should be thinned, for it is by these that the strength of the plant gets exhausted. By removing all that are too near one to be bloomed, and all those that show imperfections enough to prevent them being useful, much strength will be gained by the future flowers. So, also, by pulling off the blooms themselves, the moment they are past perfection, instead of letting them seed.

Winds and sun are both detrimental; and the practice of fixing the blooms in the centre of a flat board, and covering them with glass or flower pots, as they may want light or shade, is becoming general. The more easy way is to use a paper shade for any particular fine bloom; for however the flowers may be coaxed and nursed under cover, a stand of blooms, grown finely, and merely shaded from the hottest sun, will beat all others in brilliancy, and in standing carriage, and keeping. It is right to go round the plants, and, wherever there is a promising bud or bloom, to take away all the leaves and shoots that threaten to touch it as they grow; take off also the adjoining buds; and if the weather be windy, make it fast to a stick or one of the stakes, that it may not be bruised or frayed; shade it from the broiling sun, and it will so profit by the air and night dews, as compared with the bloom under pots and glasses, that if the growth be equal, the blooming will be superior. Nevertheless people will cover; and where there is a disposition to a hard eye, it will hardly come out perfect unless it is covered. As the end of September approaches, or as soon as you have done with the bloom, earth up the plants, in order that when the frost comes it may not reach the crown.

Preserving the Roots.

The plants may be raised without injury, immediately after the blooms are cut off by the frost, provided that they are hung up in a dry and ordinarily protected situation, with the roots uppermost, if care is taken to leave six or seven inches of the stem attached to each tuber; this may be done without the slightest fear of their withering from having been lifted in a green state. As the winter advances, and the tubers become matured and firm, the ordinary modes of protection against frost may be resorted to.

Treatment when Flowering.

When the buds of your Dahlias begin to appear, you must take them off until you think the plants have attained their full vigor, and then permit only every third bud to grow to maturity; by doing this, it is true, you will not have so numerous a show of flowers, but those which you have, will attain the highest state of perfection your plants are capable of; taking into account their situation and previous treatment, and, what is of paramount importance, the character of the season. In the treatment of flowers grown for exhibition at flower shows, it is a common practice to bind down the disk of the flower towards the earth, by which, it is said, the flowers are rendered more perfect in form, and richer in color. When in flower, the bloom should be shaded from the sun, during the hottest parts of the day.

Striped Varieties.—The striped kinds have a tendency to "run," as it is termed, into self-colored flowers, if not carefully treated, and almost invariably do so when planted in rich soil; the best mode of keeping them "clean," that is, in their prime estate as striped flowers, is to plant them in poor soil.

Autumnal and Winter Treatment.

It is the practice with many persons to take up their Dahlia roots as soon as the shrubs are cut down by the frost; this is not desirable, because if the tubers are taken up before their vital powers are in a quiescent state, they are more easily injured by the dryness of the atmosphere into which they are to be removed, and which it is necessary they should be able to bear without shrivelling; as in a moist atmosphere they are apt to become mildewed and mouldy; therefore, it is best about the end of September to cover the stems and some distance round with earth and littery dung, about six inches thick, so as to protect the crown of the tuber from injury by the early frosts; and allow them to remain in the ground till November, when they must be taken up and spread singly in a dry open shed for a few days, not allowing the sun to shine upon them, and turned occasionally during this period, so that they may be dried gradually; as, if dried too quickly, they shrivel, or too slowly, they become rotten.

When sufficiently dry, clear away the earth from them, and place them in a dry under-ground cellar, where the frost is not likely to reach them; and these should be examined throughout the winter from time to time, and if there be the least symptom of damp upon the tubers, they should be carefully wiped with a dry cloth, and receive almost daily attention. Should you not have the convenience of such a cellar, you must store them in a pit in the garden, which must be prepared in a dry spot, and be of sufficient capacity to hold all your tubers. Having dug the pit, cover the bottom with dry ashes, then pile the roots thereon, tier upon tier, so as to form a ridge; then cover them with plenty of straw, and form a ridge of earth over them of the thickness of twelve or fourteen inches.

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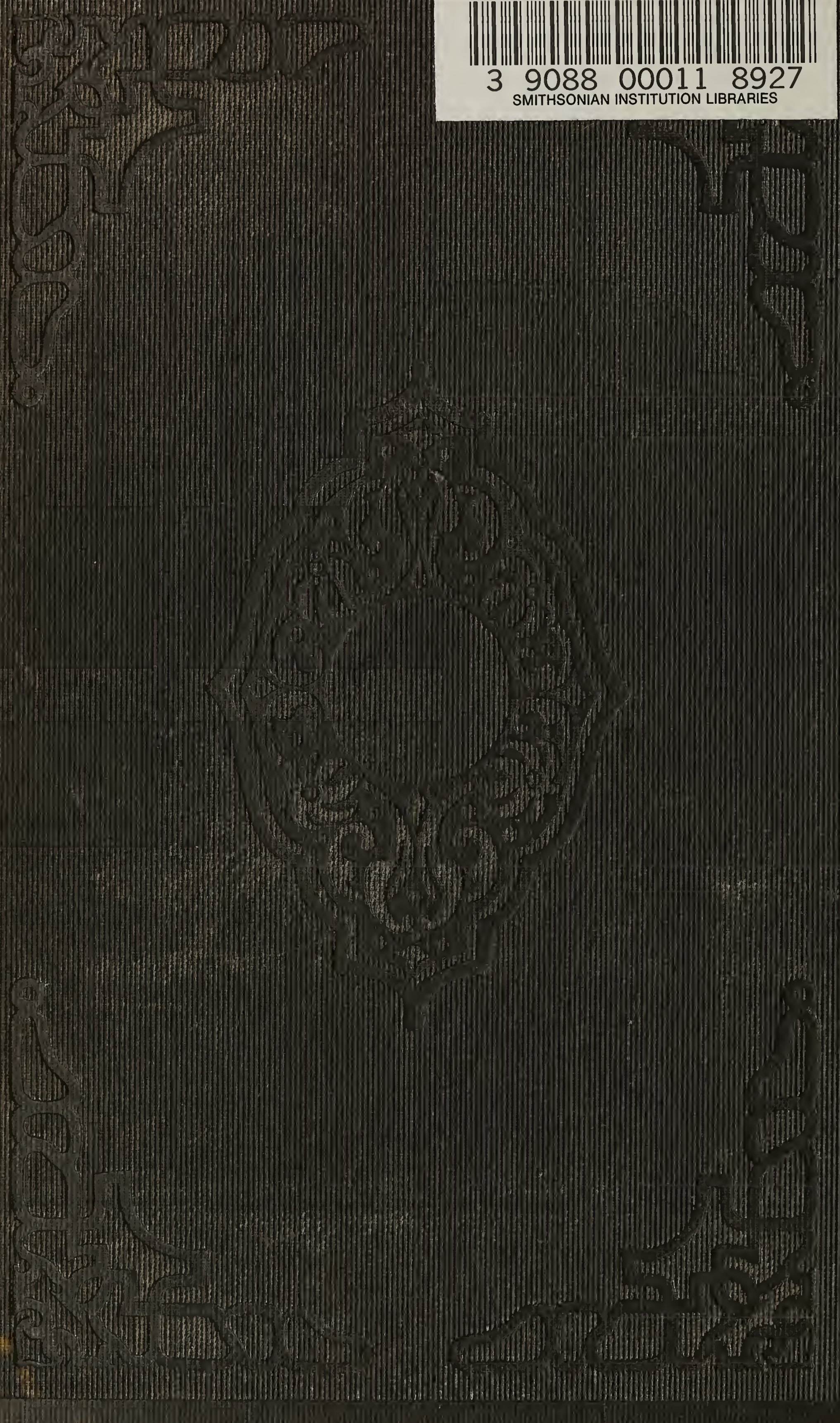

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